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Role of Educational Services in Promoting Inclusive Higher Education for Deaf and Hard of Hearing Students

Manal Alkharji

Abstract

A way to safeguard university students' educational rights is through inclusive higher education. It allows deaf and hard of hearing students (DHH) to effectively access and gain from their education. To facilitate academic success, inclusive programs must provide DHH students with diverse educational services that ensure proper access to information in lectures. This chapter discusses the role of educational services in the inclusive higher education of DHH students. These services are an integral part for the academic success of these students in higher education. The following are some of the educational services for DHH students that will be covered in the chapter: modified classroom delivery, presence of coordinators, and note-taking services, as well as the teaching experience as important elements that will influence the development of inclusive higher education for DHH students. The aim of this chapter is to describe the role of educational services for DHH students in promoting inclusive higher education through an analysis of previous research, as well as an overview of the key issues regarding these services. It also compares the roles of these services in various universities around the world. This chapter also considers the challenges of providing and using these services as a component of a comprehensive strategy for the academic integration of DHH students.

Keywords: deaf, educational services, hard of hearing, inclusive higher education, modified classroom delivery, note-taking, presence of coordinators, teaching experience

1. Introduction

Over the past years, many nations have passed legislation to guarantee equal rights and opportunities for students with disabilities in high-quality inclusive education [1]. Therefore, proponents for inclusive education have worked toward a paradigm change toward an inclusive educational system, where students with disabilities are mainstreamed into a regular classroom setting with other students [1]. Since inclusive higher education is considered one of the most important elements of inclusive

education [2], there has been a significant increase in the number of universities offering services for students with disabilities globally.

Although there has been progress in higher education institutions toward full inclusion, there are many challenges regarding the change toward inclusive education and providing services [1]. There are various barriers that prevent equal access to education that hinders the quality of education for students with disabilities, including deficiencies in service provision [2]. According to Kouroupetroglou, not all these students receive adequate levels of support even in the same nation [3]. Therefore, it is crucial to support universities and colleges in their efforts to promote inclusive education by allocating larger funding for higher education programs. Likewise, methods can be developed for monitoring, evaluating, and implementing the inclusive education program [1]. Furthermore, understanding the philosophical, pedagogical, and environmental aspects that either support or undermine access and participation for students with disabilities is essential to inclusive higher education. According to Zhang, for inclusive higher education to be successful particularly for the deaf and hard of hearing students (DHH), a support system must be put in place [2]. Moreover, developing an inclusive university requires key factors, including administrative management system and service center for DHH students. Effective academic services for students with disabilities necessitate careful planning, a suitable organizational structure, personnel with specialized knowledge, cutting-edge technological support, significant implementation effort, and functional evaluation. Hence, students will be able to participate fully and benefit effectively from their education [3].

In order to receive a high-quality education that maximizes their skills, inclusive education attempts to mainstream DHH students in a flexible learning environment [1]. Higher education institutions are not the only ones facing difficulties in inclusive education but faculty members are also under increased pressure to do more to participate in inclusive educational systems [1]. Besides that, Williams noted that there are many difficulties faced by DHH students in higher education which hinders them from participating in various aspects of education [4]. According to Albash, when pursuing a university degree, DHH students confront different obstacles than their hearing colleagues, which relates to access to information in classrooms [5]. Therefore, many services must be provided, including educational ones, to ensure their success and completion of their university studies. These accommodations for the DHH include the provision of sign language interpreters, modifying methods to deliver lessons, taking notes, transcribers, and captioning that need to be made available in accordance with the preferences of the person rather than the program's convenience [6].

2. Educational services for DHH students in higher education

For DHH students, one of the topics that must be studied in higher education institutions is educational services [7]. Educational services are offered to DHH students to enable them to meet university standards and assist them to reach their highest level of academic success in accordance with their characteristics and educational needs [8]. Educational services include all components connected to the program that the university offers to DHH students, including educational curricula, study materials, testing procedures, tutoring, instructional methods, and effective teaching [9, 10]. Implementation of educational services could open the door for inclusive education to become more effective in higher education institutions [1]. Nevertheless,

there may be a difference between the usage and provision of support services. The effectiveness of the services and whether or not students find the staff in support services to be helpful determine whether students use these services [11, 12]. The best way to deliver these services to DHH students depends on their individual characteristics and needs [13–15]. Without efficient educational services, academic challenges may make it more difficult for DHH students to meet the goals of higher education programs [16]. DHH students may struggle to comprehend the material and take part in discussions in the absence of suitable accommodations and services, lessening their understanding of the lecture [17]. According to Al-Kharji, Al-Rayes, and Powell, Language competence for DHH students, especially in terms of literacy and communication abilities, is a major concern academically [16, 18]. It is expected that DHH students' achievement trails that of their hearing peers given that the education by spoken language predominates in higher education settings [7]. Therefore, academic performance has always been challenging for DHH students [15]. Even with the abundance of academic support services in higher education institutions, there may be differences in their level of academic achievement compared to other hearing students due to limited access to educational and extracurricular activities [15].

Besides, academic success is also influenced by the diversity of auxiliary aids offered to DHH students such as captions, note-taking, tutoring, translation, and sign language interpreters [19]. It is also crucial to give DHH students the tools they need to interact socially and communicate effectively with their faculty members and fellow students, as well as guarantee that faculty members and participants in administrative service programs can offer one-on-one guidance [17]. Therefore, establishing a special office for DHH students at universities that provides these services and aids DHH students in matters concerning their academics and extracurricular activities is essential to ensure DHH students reach their full academic potential [20]. In addition, the provision of amenities and facilities designed to remove obstacles has been shown to improve academic achievement and increase the possibility for DHH students to complete their undergraduate studies [21]. According to Lang and van den Heuij, DHH students may find it helpful to overcome these issues if they have access to support services, including tutoring, interpreting, and academic counseling [10, 12]. In higher education institutions, DHH students are provided with many important forms of educational services in universities. In particular, amendment of classroom delivery, note-taking services, and coordinators, as well as teaching experience are the most critical educational services in determining the academic success of DHH students [10, 13]. **Figure 1** illustrates the relationship between educational services and teaching experience on the academic success of DHH students.

2.1 Modified classroom delivery

One of the educational services that has been frequently employed to raise the achievement of DHH students is modification of classroom delivery. It is an application of the 1997 IDEA Law, which recommended making special accommodations for DHH students in the classroom [11, 13, 22]. These educational services consist of a set of adaptations to the normal classroom delivery, which include modification of the curriculum and lesson content, private tutors, speaking slowly and distinctly by faculty members, reduction in tasks and assignments, reduction in the amount of lessons, clarifying the language of the curriculum, modifying the language in textbooks, introducing new and visual methods and means to facilitate their education, language adjustment in exams, and additional tests when needed [10, 16, 23]. Moreover,
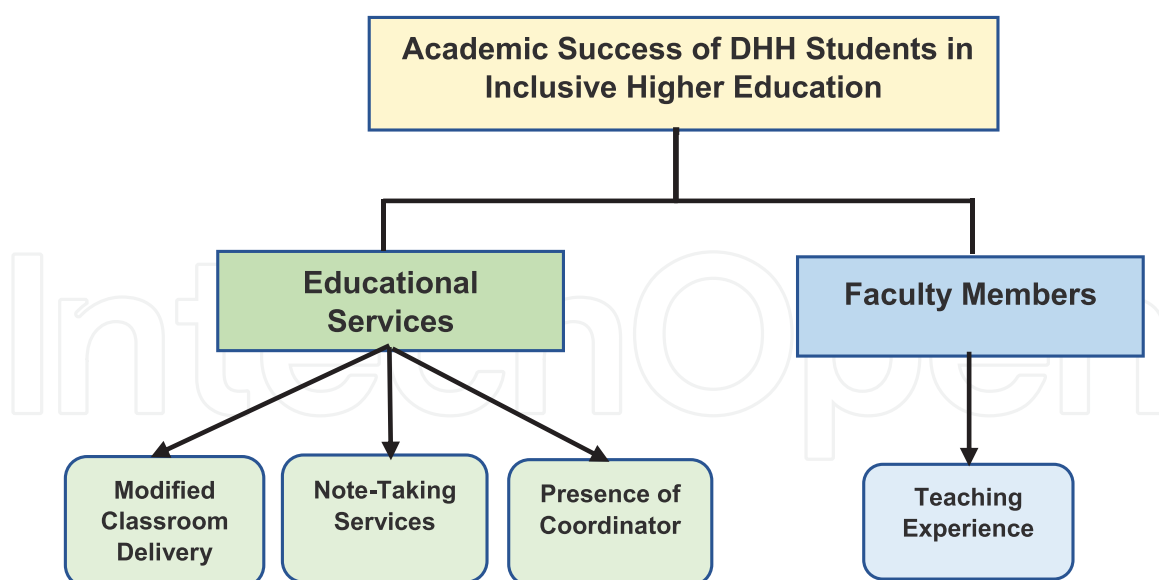
Figure 1.
Theoretical framework of some variables affecting academic success of DHH students in inclusive higher education.

improving higher education exam policy might be the first step to achieving the goal of inclusive higher education [2]. For that reason, exam modifications give extra time or the opportunity to take exams in a different room as an accessibility arrangement [12]. Hadjikaku, Petridou, and Stylianou confirmed that providing educational services related to modifying the classroom for DHH students is necessary to ensure their academic success [13].

Access to lectures and classroom discussions is one of the challenges faced by DHH students in higher education [24]. DHH students might experience difficulties since they require many educational services, such as adjusting the curriculum and teaching adaptation [2]. According to Lang, Biser, Mousley, Orlando, Porter and Liversidge, one of the academic difficulties faced by DHH students in higher education is the challenge of obtaining knowledge in the classroom [25, 26]. This is consistent with Cawthon, Schoffstalll, and Garberoglio, who mentioned that one of the barriers that DHH students faced in the higher education program relates to access to information within lectures, especially if the spoken language is predominant [7]. According to van den Heuij, DHH students have difficulty following lectures due to speech intelligibility issues and particularly bad classroom acoustics [12]. Therefore, to engage in lectures, or improve the lecture's speech understanding, access arrangements and adaptations in educational programs are required.

DHH students exhibit a higher academic need in order to reach academic success in higher education setting than hearing students in terms of academic skills and preferred communication style [27]. Evidence showed that these students lacked behind their hearing peers in academic skills [28], and they faced difficulty in social participation. Even with the provision of support services, DHH students may consider that the lectures are abstract or theoretical or that there is too much information presented in their classrooms [27]. Furthermore, previous studies indicated that DHH students face multiple academic and social difficulties, including difficulty at linking ideas between different topics [4, 29]. One of the main reasons for these difficulties is that DHH students must focus on different information sources at one time such as the faculty member, the interpreter, and the slides [23]. As a result, DHH students

who are enrolled in universities will frequently require support in lectures in order to reach their academic potential. For that reason, it is crucial that every higher education institution has a mechanism in place for identifying and documenting the needs of DHH students. These plans outline assistance and any appropriate modifications to promote students' academic success. Even though these plans specify how lectures and exams will be made available to DHH students, each faculty member will have a unique impact on how these suggestions are carried out [12].

Books, tools, and teaching methods must be modified, as well as a comprehensive service to cover the needs of the DHH students at a higher education level [25, 27]. Additionally, faculty members should use a variety of teaching strategies in the lectures, including cooperative learning strategy and participatory problem-solving strategy. Moreover, the methods of teaching in lectures must be flexible enough to meet varied requirements of all DHH students [30, 31]. Thus, it is possible to modify teaching methods to suit the skills and capabilities of DHH students [27] and take into consideration their characteristics in academic exams by allocating more time [9]. Al-Rayes noted that it is crucial to allocate DHH students an extra period of time that is at least a third of the time allotted for tests. Also, it is required and crucial to give books and lecture notes from faculty members to DHH students before the start of each semester [29].

Apart from that, sitting near the faculty member is the technique that most DHH students use in inclusive settings to understand lectures and dialogs [25]. Even though some DHH students exploited their residual hearing and considered themselves excellent lip-readers, many of them faced difficulties when the faculty members turned or walked around the room [27]. Additionally, noise reduction strategies in classrooms that prevent interference from outside and inside help these students learn more effectively. This is because it enhances the use of hearing aids and improves speech and communication among DHH students.

2.2 Note-taking services

Note-taking is a service that records information in the class, and it is providing written notes for spoken words as an alternative service for DHH students [24]. It is an important means for the learning of DHH students because it summarizes and records information during the lectures. It also provides the information from lectures that help DHH students to reorganize and fill in the missing information [32]. The advantage of this service is that DHH students can go back to the notes at home to fill in what they have missed and clarify what they did not understand in the classroom [33]. Therefore, a notetaker is a major assistance for the majority of DHH students in higher education [10].

For many years, DHH students did not receive as much information from lectures as their hearing peers [34]. While getting notes may be simple and common for hearing students, it might be challenging for DHH students, especially at higher education institutions [27]. Spradbrow and Power noted that DHH students in Australian universities miss information during lectures [35]. In addition, most DHH students find it challenging to take notes. Therefore, DHH students typically rely on a third party to provide access to information during lectures. Stinson et al. claim that DHH students at the National Technical Institute for the Deaf (NTID) and the Rochester Institute of Technology (RIT) frequently rely on others' notes as an important study tool, and they often rely on notes taken by others [24, 32]. In fact, there is little direct communication between DHH students and faculty members. Instead, they get information

from people who take notes or through publications outside of the actual time of the lectures [10]. Furthermore, DHH students may lack language skills and have difficulties paying attention to various visual tasks. Therefore, taking notes during lectures can be challenging for these students since they must focus on both the translator and the faculty member's presentations at the same time [10].

This was further confirmed by Hanafy, who noted that it was challenging for DHH students to write notes and read lips simultaneously in Saudi universities [27]. As a result, the university's support service office is required to offer the DHH students relevant services, such as utilizing the library and taking notes during lectures [10]. Additionally, employing a qualified person who can assist DHH students by creating lesson summaries and taking notes is pivotal, where this can be done by either a person qualified to write the notes down or by some hearing student colleagues who can assist them write the notes or photograph them [16].

Indeed, the views of DHH students regarding the notes were covered by Elliot, Stenson, Mackie, Everhart, and Francis, and they reported that the student found the note-taking services were very useful [36]. Additionally, university DHH students prefer to use note-taking services to advance their writing and reading skills, compile and explain their notes in class, and raise their academic accomplishment. This is in line with the findings of Liversidge in a Carnegie Research University in USA, who demonstrated that integrating DHH students by providing support services such as a notetaker encouraged them to achieve a higher academic rate and continued through the university [26].

Although it is important to take notes by the notetakers, Hastings, Brecklein, Cermak, Reynolds, Rosen, Wilson, and Stinson et al. described many limitations and challenges that DHH students faced with regards to receiving note-taking service including differences in the quality of notes [24, 37]. For example, the notes may exclude important information because the notetakers already know the information or do not appreciate its importance. Also, in some cases, notetakers cannot provide instant information upon asking a question or joining a group discussion. When DHH students do not have clear spoken communication skills, they may have to resort to using passing written notes from their hearing peers, which is often difficult. For this reason, some universities moved toward real-time captioning, where information from the faculty members is immediately copied and transmitted to the DHH by using specialized equipment [33]. This is similar to the result of Stinson et al. who compared between services in raising students' academic success rate, which asserted that DHH students preferred to use the C-print and captioning service because it was more helpful than taking notes and translation by sign language in lectures, which had a great positive impact on their academic achievement [24].

2.3 Presence of coordinators

The presence of coordinators is one of the most important components of support services. It refers to individualized direct instructional approach in addition to group help [10]. It also refers to the supervisory arrangement of a higher authority in the form of a special department and units in the universities [31], which is intended to appoint certain qualified individuals who would be responsible for supervising and coordinating the learning process of DHH students [13]. These individuals can be tasked to establish a mechanism for evaluating university performance to achieve quality and efficiency in the higher education system for

DHH students [29]. Moreover, they can conduct regular assessment processes and provide DHH students with necessary instructions, guidance, and academic counseling related to university support services through a meeting between the student and the student assistance officer, especially for all freshmen at some universities [12, 29].

One strategy for coordinators is to pay close attention to how well support services are working [10, 13]. It includes special supervisors for DHH students who visit higher education institutions several times a week depending on the students' needs, share their knowledge with the faculty members, and discuss the problems which the students face. Faculty members believe that coordinators are very helpful to the successful integration of DHH students. Coordinators can also help faculty members in their work by giving lessons to small groups of DHH students. Besides that, faculty members might observe them to pick up effective teaching strategies [13]. Additionally, student support officers offer qualified information, counsel, and assistance to fulfill the requirements of the students [12]. Often, this supervision is under the management of the university's service office for DHH students to provide a suitable educational environment [27].

It is necessary to have a university's support service office for DHH students on campus in order to facilitate communication and academic performance through offering services that are suitable for each student's needs [27]. Al-Rayes asserts that it is critical for universities and colleges to establish support service offices to give DHH students access to an appropriate learning environment [29]. Also, Al-Fangary et al. recommended that the universities must establish an information and educational service office within the university, and the need for a center of university support services with quality standards for DHH students to achieve academic success [31]. Furthermore, Al-Rayes also advocated for the necessity of activating the role of the university's support service office. This is due to the significant role it plays in providing academic counseling and ensuring that a source room is prepared and equipped with the necessary requirements for DHH students [29].

According to Hanafy, the university's support service office is the primary means for DHH students to integrate into university life socially and academically [27]. According to Liversidge, DHH students who were integrated at the undergraduate level through the institution's support systems were better able to maintain their enrollment in the university and achieve higher academic rates [26]. In addition, the necessity of academic counseling for DHH students in higher education through the university's support services office was also emphasized in several reports [16]. More importantly, the support service office staff at the university must be flexible and willing to develop and implement new policies and procedures [38].

In contrast, the main problems that the service office faces include the lack of availability of support services. The lack of support services in higher education institutions is considered one of the biggest obstacles that limit the acceptance of DHH students [30]. Although support factors must be provided according to what the law states, the expenses incurred by the universities can be stunted [27]. Therefore, collaborative efforts are needed to ensure an inclusive environment that fosters engagement for DHH students is present [7, 39]. This was confirmed by Johnson and Fann who recommended the necessity of practices for campus access offices to accredit in order to effectively serve the DHH students [14]. These practices included mentoring of DHH students and the faculty members, providing expert advice, using student feedback, and increasing campus and community awareness of the services provided.

3. The relationship between teaching experience and educational services

Over the past years, there have been many difficulties regarding inclusive education and inadequate expertise in special education is one of them [11]. Universities have been seen to face challenges that are in line with the recent trends in teaching DHH students, and these include the lack of experience of faculty members in teaching these students. According to Zhang, Rosen, Cheng, and Li, the faculty members lack the necessary expertise, skills, and solutions to deal with the students with disabilities in higher education institutions [2]. This shows that an educational service center for these students, and an administrative support system for faculty members and students are all necessary for the efficient implementation of inclusive higher education. According to Relevant research, faculty members are the key to the support system, and they have a very important role in the development of inclusive higher education [2, 40, 41]. Additionally, faculty members with experience in teaching DHH students were shown to be more receptive to inclusive higher education by adapting their teaching strategies to address the demands of comprehensive education [2, 42]. Thus, cooperative human resources and improved teaching expertise have been proven to be effective strategies for successful inclusive education [43].

Since DHH students have special requirements, faculty members have important roles in affecting students' achievement in universities because teaching expertise can make a difference in students' learning. Engaging DHH students in a higher education context necessitates faculty members who can interact and understand them and modify their lessons to fit their needs [17]. Also, faculty members in higher education institutions have the responsibility to meet the needs of DHH students and help them achieve academic success. Therefore, they must also implement the best practices and effective educational interventions when they understand the support services that these students need [7]. Al-Fangary et al. asserted that the selection of teaching strategies made by university faculty members has a significant impact on the learning of DHH students since it facilitates the accomplishment of learning objectives [31].

Furthermore, the more important educational services that should be available to support the educational needs of DHH students revolve around teaching strategies and appropriate technologies through which they can reach or obtain the information required in the field of their specializations [29]. According to Zhang et al., faculty members lack inclusive teaching methods and adaptation techniques, as well as a comprehension of the unique demands of students with disabilities including DHH students. Therefore, before implementing inclusive education, university teachers must have a better understanding of the fundamental special requirements and fundamental adaptations of DHH students [2].

Moreover, measures must be taken to facilitate communication between the faculty member and the DHH students. This can be done either by writing a letter to the faculty members at the beginning of the new semester or by conducting a meeting between the teaching staff and the DHH students. These measures are important to inform the faculty members that there are students with DHH and discuss the services they need during lectures. Therefore, faculty members must have knowledge regarding the characteristics of the DHH students [44]. There is a big difference in the participation of DHH students in lecture discussions as much as the participation of the hearing students when the faculty collaborates with the students [10].

Furthermore, they must allocate additional time for DHH students to discuss and answer any questions they need [45]. There is also a need to emphasize the

importance of cooperation between the faculty members and the service providers. The importance of a positive working connection between the faculty member and the DHH student, as well as with other academic service providers serving as tutors in individual or group sessions, was stressed by Lang et al. [25]. The faculty members must provide sign language interpreters a copy of the courses before the start of the lectures with a good period of time for them to read, master, and be able to translate the lectures fully [45]. They should also give DHH students equal opportunity to raise questions while altering their lecture delivery. According to Braun, Clark, Marchut, Solomon, Majocha, Davenport, and Gormally, faculty members have to pause before asking students to respond for 10 seconds in order to give the interpreter enough time to translate for the students [14, 23].

Generally, faculty members understand the need for special preparations in their classrooms for DHH students [20]. In addition, inadequate teaching practices and teachers' lack of proficiency in sign language are two other significant barriers to the inclusion of DHH students in higher education [29]. Ju also noted that the faculty members are unaware of sign language. In fact, it may be difficult to require that every university instructor be a licensed special educator [46]. To expect everyone to become fluent in sign language is impractical. However, professionals with specialized skills could assist faculty members by educating them on a range of techniques for instructing those DHH students [2].

In summary, studies indicated that students who have integrated into the universities face multiple academic difficulties, including the lack of faculty expertise on how to teach DHH students [30]. To deal with the lack of experience of faculty members at universities, it is necessary to prepare those who will teach DHH students by different methods, whether in the preparatory year or at the university. First method is by training them with modern teaching methods. Al-Rayes stressed the need to prepare the faculty members who will teach DHH students in Saudi Arabian institutions using different teaching methods. These can help these students to illustrate the concepts [29].

Second is by holding training workshops on the characteristics, abilities, needs, and rights of DHH students at higher education levels. Several past studies have shown that more than 200 faculty members in universities indicated that 80% of them had limited or no knowledge regarding legislation for DHH students [47]. Therefore, education and training are necessary for the faculty members to deal and teach DHH students appropriately [17]. Third is by holding training workshops on how to deal with DHH students and different communication methods of these students, such as sign language and lip-reading [27]. Previous studies emphasized and recommended the necessity of holding training courses for faculty members on how to deal and communicate with DHH students [30, 31].

Fourth is by holding workshops to train faculty members on how to provide services for DHH students in universities. There are two important factors to provide appropriate modifications to DHH students. First is the faculty's knowledge on legal responsibilities, and whether they believe they are receiving the necessary support from the institutions in which they work. Second is training of faculty members through meetings and workshops to take advantage of all the services that are provided to DHH students in higher education institutions [48]. Moreover, Al-Ajlan indicated that the faculty members of 12 different institutes of higher education were unsure of the appropriate adjustments that needed to be provided [47]. Therefore, it is necessary for the faculty members to have sufficient knowledge and experience about these services and how to provide and use them in the learning process.

Lastly is the training on how to employ modern technologies in teaching DHH students. Technological proficiency should be a characteristic of all successful special education academics. Knowledge and skills of the faculty members in technology are directly correlated to the success of the students. Therefore, it is imperative for faculty members of the DHH students to be familiar with instructional technology such as assistive technologies, internet use, and educational software. They also should have experiences that help them develop their ability to use technology effectively [17]. According to Holmstrom and Schonstrom, the availability of technologies, such as hearing aids, real-time captioning, computer, and sign language interpreters, are insufficient in enhancing communication in the classrooms without teachers' knowledge on the use of technology and the methods of appropriate teaching [49]. Therefore, it is possible to benefit from Shulman's framework (1986) for technology, pedagogy, content, and knowledge (TPACK), which was developed by many

Service	Approach	Examples
Modified Classroom Delivery	Special modifications for DHH students in the classroom by faculty members.	• Provide instructional plans for the course early in the semester. • Provide announcements regarding class times, activities, and fieldwork, both in writing and verbally. • Unobstructed line of vision in the classroom. • Reduce distracting noise. • Avoid speaking when facing the blackboard. • Diversity in teaching methods. • Using visual presentations. • Present information in simple, structured, and in a sequential manner. • Encourage students to participate in classroom discussions and activities. • Encourage students to partake in communication during activities. • Repetition of questions. • Extra time to complete assignments. • Reduce quantity of tests. • Extra time on exams. • Provide alternate tests when needed [52–55].
Note-taking Services	Recording of information presented in the classroom, by providing written notes for DHH students.	• Employing qualified individuals to take notes. • Take clear and organized notes and information. • Defining important and difficult vocabulary. • Recording lectures [52–55].
Presence of Coordinators	A special unit in the universities, which is intended to appoint certain qualified individuals who would be responsible for supervising, coordinating, and following the learning process of DHH students.	• Provide necessary services. • Provide necessary instructions and guidance. • Regular assessment processes. • Dealing with academic complaints. • Take corrective measures to solve problems [52–55].

Service	Approach	Examples
Teaching Experience	Faculty members' level of competency and skills in terms of pedagogy, content, technology, and knowledge, as well as handling DHH students.	• Organize and maintain classroom management. • Have sufficient knowledge about subjects. • Know about the possible student learning difficulties. • Select and adapt teaching styles to different learners. • Use appropriate technologies to explain difficult topics. • Guide students' discussions during group work. • Know how to assess students in multiple ways. • Guide students in planning their own learning. • Guide students to solve problems related with content. • Know how to guide students' critical and creative thinking. • Have the technical skills to use technology. • Use ICT as a tool in group work, solve problem, and for critical and creative thinking [56, 57]

Table 1.
Summarizes and examples of educational services and teaching experience in inclusive higher education for DHH students.

researchers [50, 51]. **Table 1** summarizes the most important examples of educational services and teaching experience in inclusive higher education for DHH students based on studies and research.

4. Methodology

Several steps were taken to guarantee a high-quality review of the prior literature on educational services and teaching experience. Initially, a comprehensive search was done in academic journals that focused on DHH student education, particularly in higher education, and included the following publications: Journal of Deaf Studies and Deaf Education, Journal of Developmental and Physical Disabilities, International Journal of Education and Practice, Issues in Educational Research, Higher Education Studies, Journal of Postsecondary Education and disability, Higher Education Research and Development, International Journal of Disability, Development, and Education, as well as Journal of Research in Special Educational Needs. Second, basic terms, such as educational services, classroom modifications, note-taking, teaching experience of faculty members, supervisors, DHH students' academic achievement, and inclusive higher education were used to search in conference papers, PhD thesis, as well as the most recent research and studies. Google Scholar, ERIC, Proquest, Scopus, Web of Science, and Saudi Digital Library (SDL) were among the six databases that were searched. Third, new additional articles were searched in the references section of each article that was viewed. Finally, after reading all of these studies and papers, the findings and key points relevant to the topic of this review were summarized. 58 articles and research from the years 2000 to 2023 were
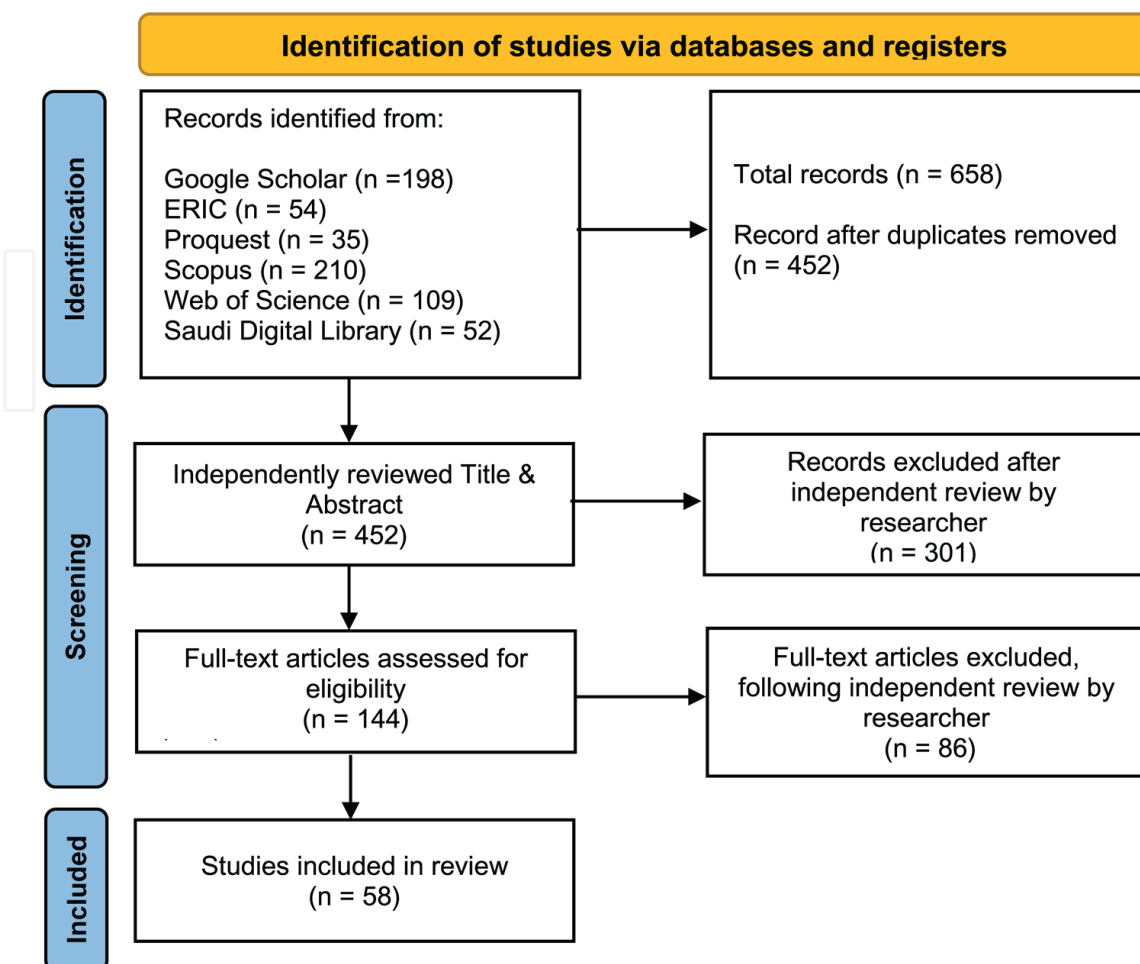
Figure 2.
A flowchart outlining the search and screening procedure of databases.

located through the search. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were followed when developing the review [58]. **Figure 2** shows the PRISMA flow chart.

5. Conclusion and recommendations

This chapter has reviewed the educational services that DHH students need to ensure efficient access to information in classroom settings in inclusive higher education. The focus was on three types of these educational services, including modified classroom delivery, presence of coordinators, note-taking services, and as well as the teaching experience and its relationship to these services. Previous studies showed the importance of educational services on the learning outcomes of DHH students in inclusive higher education because these services assist DHH students in overcoming academic difficulties that may prevent some of them from obtaining a university degree [4, 7, 10, 15, 26, 30]. Thus, a comprehensive understanding of how these services are provided will greatly contribute to improving and developing higher education for DHH students and motivate successful experiences in universities and colleges [54]. According to Alkharji and Cheong, there is a positive relationship between the provision and use of the educational services provided by the university's support services office, such as note-taking service and the academic achievement of

DHH students in higher education institutions [54]. On the other hand, Mwanyuma indicated that there was a strong correlation between the lack of learning resources and the academic achievement of DHH students [59].

Besides that, some studies examined the roles and responsibilities that faculty members should implement to reach the best practices and effective educational interventions [7, 47]. For example, meeting DHH students' needs to help them achieve academic success [36], making minor adjustments to the curriculum [47], as well as allocating additional time for DHH students to discuss and answer any questions [45]. In addition, there are several educational strategies such as allowing more time for evaluation, choosing an alternative evaluation when needed, and slowing down the pace of instruction [31]. Sun and Huang indicated that teaching expertise as an independent variable has a direct effect on support services for students with disabilities in the classroom, such as modifications to the classroom environment and teaching methods [11]. Accordingly, faculty members who are teaching DHH students in universities should have a very high level of competencies, besides knowledge, skills, and abilities [47].

In light of the previous literature, a number of recommendations and suggestions were proposed that might help policymakers and decision makers in educational practices to develop inclusive higher education for DHH students more effectively. These recommendations are related to the plans, policies, and guidelines that should be implemented to ensure the quality and effectiveness, as well as educational services to reach the learning outcomes required for DHH students. Thus, achieving overall success in inclusive higher education for these students. These recommendations were presented to several bodies responsible for programs of DHH students such as policymakers, higher education institutions, university's support service offices, and faculty members, and they were presented as follows.

First, are the recommendations for the policymakers. They should work side by side with stakeholders specializing in higher education programs for DHH students in order to ensure the provision of all the educational services that reflect on students' learning outcomes and commensurate with the needs and abilities of these students. Moreover, a mechanism should be established to evaluate the performance of higher educational institutions to achieve quality and efficiency in the system of higher education programs for DHH students. Moreover, they should put in place policies and regulations that focus on classifying standards for educational services in higher education institutions to guide students' efforts toward success and achievement of goals. In addition, policymakers should grant the appropriate authority to higher education institutions to choose, employ, and use any educational service that may help in raising DHH students' academic success. In addition, policymakers and stakeholders in inclusive higher education should search for effective methods, systems, and policies that help them properly employ the educational services that contribute to the development of inclusive higher education programs for DHH students. More importantly, they should pay more attention to the importance of teaching expertise for faculty members in higher education by recruiting qualified faculty members to reach satisfactory results for both DHH students and higher education programs.

Second, are the recommendations for higher education institutions. Institutions that have a program for DHH students should establish a support service office to provide, follow up, and evaluate educational services for these students. Other than that, the institutions should conduct regular assessments that show how well each factor and service meets the needs of DHH students. Additionally, universities and colleges should establish a training center for faculty members who will work with DHH

students to train them in modern teaching methods in line with the needs of students. Furthermore, higher education institutions should focus on developing the teaching expertise of faculty members regarding teaching methods and communication with DHH students through holding workshops and training courses that enhance their teaching experience. Also, they should develop a tool to assess faculty members and their teaching performance at regular intervals in order to identify their weaknesses in teaching these students. More so, train the administrative apparatus within educational institutions on how to communicate and work with DHH students. Training courses for DHH students should be held before and during their enrolment in higher education to develop and enhance personal factors and academic, linguistic, and social skills related to supporting their academic achievement. Besides, higher education institutions must take into account the current results of DHH students in the future development plans of inclusive higher education.

Third, are the recommendations for the university's support service office. The university's support service office should provide the necessary educational services to DHH students, as well as instructions and guidance that relate to these services such as note-taking, one or group sessions, and sign language interpreters. Moreover, there should be clear procedures between the general supervisor and the supervisors of the support units specializing in the university's student program. Lastly, the supervisors working in the university's support services office should have a clear mechanism to deal with students' academic complaints and take measures to correct and address these problems.

Lastly, are the recommendations for faculty members. Higher education institutions should encourage faculty members who are working with DHH students in universities to pursue continuous professional training by providing support, for example, establishing a university program to train faculty members. Besides that, faculty members should provide individual and group sessions to these students to ensure understanding of the learning materials. Furthermore, faculty members should give DHH students in higher education programs more time when needed to take exams. They should also pay more attention in developing their competencies and skills that reflect positive results for these students in higher education through courses and workshops. On the other hand, researchers should investigate the views of faculty members and conduct interviews with them to explore and study more factors that help academic leaders understand the nature of inclusion of DHH students in higher education.

Through the previous review and recommendations, there are basic educational requirements and services for inclusive higher education that must be provided and employed appropriately. Higher education institutions need to delve deeper into inclusive education as they need policies and systems to evaluate the current situation and what is happening in practice. Higher education institutions should make an effort to understand DHH student diversity and consider students' full participation in decisions made about the education they receive by giving them the opportunity to provide feedback and participate in the selection and implementation of educational services. Therefore, providing comprehensive and supportive environments that ensure the availability of the educational services they need is one of the most important goals of Inclusive higher education.

Author details

Manal Alkharji
Princess Nourah Bint Abdulrahman University, Riyadh, Saudi Arabia

*Address all correspondence to: mmalkharji@pnu.edu.sa

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