Predicting the Academic Success of the Deaf and Hard of Hearing University Students: A Multilevel Analysis

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Abstract

Predicting the Academic Success of the Deaf and Hard of Hearing University Students:

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Second Language (L2) learners and Deaf and Hard of Hearing (Deaf/HH) students share some commonalities. Both groups are required to obtain a minimum score on Language Proficiency Tests (LPT) to gain acceptance into university level institutions. However, even with accommodations, language proficiency testing becomes more complicated for Deaf/HH students because LPTs were created for hearing people and there is no specific test for Deaf/HH individuals. In Arabic countries, the only LPT for Deaf/HH students is at King Saud University (KSU). This dissertation used multilevel logistic modeling to 1) investigate whether the LPT uniquely predicted academic success for Deaf/HH students at KSU after controlling for individual characteristics, and 2) to Evaluate certain the student characteristics that moderate the

relationship between the LPT and passing the Qualifying Year Program (QYP). A total of 619 Deaf/HH students participated in the study across 12 regions in the Kingdom of Saudi Arabia. The results indicated that, within region, the LPT scores significantly predicted the likelihood of passing the QYP. However, LPT was not significantly predictive of the likelihood of passing the QYP in the aggregate, region level. The results also showed that students who were female, HH, and had higher high school GPAs were more likely to pass the QYP. The current context for Deaf/HH students in Arabic universities, including assessment protocols and test shortcomings along with the results of the analysis, are discussed.

Keywords: Deaf and hard of hearing, language proficiency test, academic success, bilingualism

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Dedication

I dedicate this work to:

My father, my hero, my inspiration, Hamza, who left this world when I was only 17 years old. You are always in my heart, and I think of you every day of my life.

My mother, Elham, you have been my protector and provider for all of my life and you are the reason I have become what I am today. You are the air I breathe.

My wife and my soulmate, Sondos, your unshakable belief in me has kept my spirits and motivation high during our incredible adventure together. Thank you! I can't imagine having walked down this road without your love, support, and smiles. You are the colors of my life.

My kids, Tariq, Diana, and Celine, you are the joy of my life. Looking at your beautiful little faces and imagining the lives you will have fills me with awe and motivates me to do everything in my power to provide you with futures with endless possibilities.

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CHAPTER ONE

Introduction and Statement of the Problem

Pursuing higher education has become a fundamental and vital element in supporting human development in the 21st century. It serves to strengthen both governmental and societal growth as individuals complete their studies and become part of that society (Alrayes & Al-munaie, 2014; Kyllonen, 2012). It is also an essential step to keeping pace with the labor market requirements that will provide better job opportunities and lifestyles (Clark & Anderson, 1992). However, the notion of receiving higher education as a minority, as an individual with a disability such as being Deaf or Hard of Hearing, only became a realistic endeavor in Saudi Arabia quite recently (Alrayes, 2014). I use Deaf and Hard of Hearing (Deaf/HH) with capital letters to refer to my participants to represent Deafhood as a culture rather than a deficit.

Deaf/HH People and Other Minorities

There is a common history between the Deaf/HH people and other minorities as both groups have been segregated, often because of the belief of biological and/or cultural inferiority (O'Brien et al., 2015). Hearing people who dominate culture rationalize the reasons for segregating Deaf/HH people due to their hearing loss. Even though Deaf/HH people have been marginalized because of ableism, many Deaf/HH people are able to persevere to attend higher education (Bell et al., 2016; Cheng et al., 2016; Kermit & Holiman, 2018; Lane, 2002; Luetke-Stahlman, 1982; Parasnis & Fischer, 2005; Richardson et al., 2004; Whyte & Guiffrida, 2008). The number of Deaf/HH students who have enrolled in higher education has significantly increased within the last three decades (Alrayes & Al-munaiei, 2014; Bell et al., 2016; Cheng et al., 2016; Lang, 2002; Lewis, 1994; Noble, 2010; Whyte & Guiffrida, 2008).

In general, for all students, irrespective of whether they are Deaf/HH or hearing students, university life represents a new experience and imposes several challenges for them when adapting to the new level of educational demands. Especially confusing to students is their loss of family support, the necessity of building new relationships and identities, and the need to meet academic standards that attending a university requires (Alwahib, 2021; Bisol et al., 2010; Whyte & Guiffrida, 2008). However, Deaf/HH students encounter additional challenges that work against them and act as barriers that limit their ability to continue, much less complete their university studies (Foster et al., 1999; Whyte & Guiffrida, 2008).

Perhaps surprisingly (for the hearing community), the natural and native language of Deaf/HH individuals is a visual or sign language, and the spoken language of their country is their second language (L2) (Lane, 2005; Marschark et al., 2014). As a result of using two different languages, they are considered bilingual or multilingual (Holcomb, 2012). Critically, when they go to the university, they are often categorized as L2 learners in whatever country they live in. As a result of being considered a minority group, Deaf/HH students face almost the same difficulties that other minority groups encounter. In fact, there are several common aspects between L2 learners and Deaf/HH students in regards to their educational experiences (Berent & Kelly, 2008). In relation to learning at the university level, they both encounter numerous difficulties when having to use their L2 (Braswell-Burris, 2010) and when developing their literacy skills in their L2 (Mayer, 2009). Additionally, both groups are required to have a minimum score in Language Proficiency Tests (LPTs) to get accepted at universities around the world because there is a significant correlation between L2 learner's proficiency and academic success (Burgess & Greis, 1970; García-Vázquez et al., 1997; Ginther & Yan, 2018; Gue & Holdaway, 1973; Maleki & Zangani, 2007) and many universities also use high school grade

point average (GPA) and ranking to make admission decisions. However, the scenario becomes even more precarious for Deaf/HH students than for other bilingual students.

The Importance of Literacy

Literacy plays a vital role in gaining information and extending our knowledge whether in one's personal, social, academic, or professional life (Graham et al., 2018; Olson, 2009; Zua, 2017). Alsalem (2018) defined literacy as, "Both knowledge and skills that directly enable individuals to reach a level of proficiency in different tasks" (p. 646). Literacy is a fundamental skill in academic life because it is an essential requirement for most activities in university courses in whatever language is spoken there (Logan & Johnston, 2009). Since both parties (Deaf/HH and hearing societies) are not generally highly proficient in each other's language, the ability to read and write becomes even more critical for Deaf/HH people (Hermans et al., 2008; Lane, 2005). To illustrate, for Deaf/HH students, it is one of the main conduits to gain knowledge or communicate their knowledge in a university setting (Alawad & Alrayes, 2013).

Unfortunately, late L1 acquisition has deleterious effects on the ability to learn other languages and reading development (Mayberry, 2010; Mayberry et al., 2002). To illustrate, the delay in learning sign language as the first language (L1) generally causes Deaf/HH students to face difficulties in regard to learning and understanding through their L2 (Kelly & Berent, 2011). Thus, the lack of language proficiency prevents a high percentage of Deaf/HH students from achieving academic success (Alrayes, 2014; Alrayes & Al-munaiei, 2014). Almost 75 percent of students with hearing loss withdraw from the university before they obtain their degrees (Appelman et al., 2012; Ward, 2015;). Literacy and language differences might be some of the reasons for the low graduation percentage of Deaf/HH students from university (Bowe, 2003). It is imperative to determine if there is a correlation between language proficiency and academic

success in universities that use such tests, and to specify if the LPTs Deaf/HH students are required to take to get accepted at universities are valid instruments to measure their language ability.

I hypothesize that using the LPT as one of the admissions criteria at King Saud University (KSU) for Deaf/HH students needs to be reconsidered. First and foremost, it is critical to understand the role the LPT plays in the academic success of Deaf/HH. In other words, we need to know the predictive validity of the LPT for passing the QYP after controlling individual characteristics: cohort year, gender, hearing status, high school percentile GPA, and school type. Moreover, we need to investigate the interaction between LPT scores and the previous individuals' characteristics. The LPT can act as a barrier to potential students, reducing their access to higher education. Therefore, it is important to make sure the LPT functions in a way that is helpful to faculty and students alike. Presently, despite the existence of several standardized LPTs in Arabic for hearing L2 learners or native speakers, there is no standardized LPT to measure reading comprehension and writing ability for Deaf/HH students in Arabic, whether in the Kingdom of Saudi Arabia or other Arabic countries. This lack of a well-developed, psychometrically sound LPT is due to the recent development of Deaf education in Arabian countries (Alrayes & Al-munaiei, 2014) and needs to be addressed.

CHAPTER TWO

Literature Review and Conceptual Framework

In this chapter, I will review the literature on (a) language and literacy among Deaf/HH students, (b) Deaf/HH education in Saudi Arabia, (c) higher education of Deaf/HH students in Saudi Arabia, and (d) language proficiency tests in Arabic.

Language and Literacy Among Deaf/HH Students

The Literacy Level of Deaf/HH Students

Literacy is an essential skill for all students. However, this particular fundamental skill is often difficult for Deaf/HH students to acquire (Alrayes, 2006; Alrayes, 2014; Alrayes & Al-munaiei, 2014; Alsalem, 2018; Harris & Terlektsi, 2011; Kuntze et al., 2014). Several studies have indicated that Deaf/HH students encounter significant difficulties in learning to read in English and revealed that students with hearing loss were below average in English reading skills even though they were of average or above average intelligence (Easterbrooks & Beal-Alvarez, 2012; Luckner, 2013; Mann, 2016; Nagle et al., 2016; Samar & Parasnis, 2007). This is consistent with the Richardson et al. (2004) findings that Deaf/HH students have the same ability to learn as their hearing peers. This clearly demonstrates that the lower literacy levels of Deaf/HH students does not stem from low intelligence or mental capabilities and instead is likely to stem from educational programs that do not meet their needs. Nevertheless, concerning this point, it would be premature to apply these English research results to Arabic Deaf/HH education as we do not have similar assessments to measure this vital academic skill. Additionally, there is a lack of empirical studies in this area in Arabic research. For this reason, it is difficult to cite any relevant Arabic literature and it is clear that there is a need for the current study.

In the same fashion, Deaf/HH students also face difficulties in writing in English as evidenced by their lagging performance behind their hearing peers (Isaacson & Luckner, 1988; Musselman & Szanto, 1998; Paul & Quigley, 1994). The irrefutable fact is that reading and writing are deeply interwoven and are developed in parallel (Fitzgerald & Shanahan, 2000; Shanahan, 1990). Again, due to difficulties with measurement, there have been no similar findings for writing in Arabic. Nevertheless, among students at KSU, we find that Deaf/HH students demonstrate low literacy levels, and for many of them, this particular issue works as a barrier that prevents them from continuing higher education.

Deaf/HH Students and Bilingualism

To understand a Deaf/HH student's dilemma in literacy, it is important to know that there is a positive correlation between hearing loss and language development (Delage & Tuller, 2007; Nelson & Crumpton, 2015). That is, a higher degree of hearing loss leads to a more substantial negative impact on language acquisition (Kral & O'Donoghue, 2010). Deaf/HH students do not depend mainly on their auditory sense for language acquisition (Ferjan Ramírez, 2013; Moores, 2001) and most importantly that most of them are born to hearing families who do not naturally communicate in sign language (Harris, 2001; Marschark et al., 2001; Marschark et al., 2014).

Given the breadth of the subject, it is necessary to understand why Deaf/HH individuals are bilingual and how it affects their language development. Branson and Miller (2006) stated, "Language is culture, a product and manifestation of culture" (p. 118). Sign language is the cornerstone of Deaf culture. William Stokoe, through his body of research related to sign language, which was published starting in 1960, proved that sign language is a genuine language with unique syntax and grammar like spoken languages (Alrayes, 2006; Johnson, 1989). Moreover, as a result of its similarity to spoken languages, it has the full features and

characteristics necessary to empower its users to communicate and learn. Furthermore, this visual language is readily acquired/ learned by Deaf children. Even though it does not have a written form like many "indigenous languages" (Dostal & Wolbers, 2014), it has become unquestionable that sign language is a real language just like any other language (Vermeerbergen, 2006). There are many kinds of sign language, ranging from American Sign Language (ASL) and Chinese Sign Language to Mexican Sign Language, and Arabic Sign Language. Each Arab country has its own sign language. In this study, the target Deaf/HH students use Saudi Sign Language. Each cultural group has developed their own language, including dialects such as Black Sign Variation, a dialect of ASL.

Deaf/HH people belong to a minority group that has its own sign language and culture but must function within a hearing society that uses a spoken language which is different from sign language. They need to learn the L2 (the spoken and written language) that is used in their hearing society to be able to access knowledge and function in that society. Therefore, Deaf/HH people are bilingual people. Bilinguals as Butler and Hakuta (2006) defined them, are:

> Language minority groups whose own language does not have a high status in the dominant language society in which they reside, whereas elite bilinguals are those who speak a dominant language in a given society and who also speak another language which gives them additional value within the society. (p. 118)

This definition correlates with the reality of Deaf/HH people using the Saudi Sign Language as their L1 and the Arabic language as L2 as in the present study.

For the purposes of definition, Deaf/HH individuals are bilingual students who have hearing loss, use sign language to communicate and learn, and have their own unique culture. Thus, it follows that for whichever country in which Deaf/HH people live, the culture and language in that area are unfamiliar to them.

Research has proved that an overwhelming majority of Deaf children (almost 90%) are born to hearing parents (Marschark et al., 2001; Marschark et al., 2014). This will be the point of entry to understand the associated issue of the delayed language acquisition of Deaf/HH people. Children acquire language at an early age, naturally and at a great rate, in a richer linguistic environment than adults, and this represents the concept of the Critical Period Hypothesis (CPH) (Ferjan Ramírez, 2013; Mayberry, 2010). Linguistic researchers are broadly in agreement that the longer a language (spoken or sign language) is delayed in exposure, the greater the decline in ultimate attainment (Mayberry & Kluender, 2018). Deaf children's needs in the areas of communication and language acquisition are heavily influenced by the parents' perceptions and how they regard the issue of hearing loss from the beginning (Dunst et al., 2008; Powell & Dunlap, 2010). In spite of sign language's deep penetration into Deaf Education and Culture, a growing body of literature has shown that Deaf children of hearing parents generally do not have the opportunity to access it at home at an early age (Anderson & Reilly, 2002; Dostal & Wolbers, 2014; Ferjan Ramírez, 2013; Mayberry & Eichen, 1991; Mayberry et al., 2002; Shantie & Hoffmeister, 2000). Thus, Deaf children often have a delay in their L1 (sign language) acquisition.

In contrast, Deaf children of Deaf parents perform academically and socially better than Deaf children of hearing parents (Hadadian & Rose, 1991; Harris, 2001; Ritter-Brinton & Stewart, 1992; Strong & Prinz, 2000). Deaf children of Deaf parents acquire their L1 (sign

language) on a platinum platter from native signers, their Deaf parents, at an early age. As a result of being able to access sign language at an early age, Marschark et al. (2001) determined that the average age of Deaf children of Deaf parents to start learning their L1 (sign language) is one year old or less. Mayberry and Squires (2006) reported that first signs emerge between eight and 16 months like the spoken words with hearing children. Also, they reported that at about three years old, verb use develops, and they use signs to inflect verbs in their immediate environment. Between four to five years old, they develop verb agreement and experience similar errors to hearing children (overgeneralizations to verbs that cannot take agreement). Thus, Deaf children of Deaf parents attend the school with a strong L1 that helps them to learn an L2. This is known as the Transfer or Crosslinguistic influence. This "transfer" occurs between the L1 and L2 and it means mastering an L1, including sign language, will increase the opportunity of successful L2 acquisition (Emmorey et al., 2008; Krashen, 1996; Ortega, 2014; Park & Han, 2008; Samway & McKeon, 1999). In general, Deaf children who acquire sign language as their L1 in infancy experience it in the same way and steps that hearing children acquire spoken language (Chamberlain et al., 2000; Emmorey et al., 1995; Ferjan Ramírez, 2013).

In Saudi Arabia, there is no research on the early linguistic environments of Deaf/HH students. However, we can infer from the average age of hearing loss identification in Saudi Arabia that Deaf/HH children generally are identified at school age (Alqahtani, 2017; Alqarni, 2017). Also, we can infer from the medical view, which is predominant in Saudi Arabia, that Deaf/HH students of non-signer hearing parents do not have the opportunity to learn L1 at an early age.

Deaf/HH Education in Saudi Arabia

The History of Deaf/HH Education

In the past, students with disabilities encountered restricted opportunities after finishing high school. However, post-secondary options for students with disabilities changed when the government passed regulations and legislation to ensure equal access to higher education and to give people with disabilities the chance to find desirable employment (Eckes & Ochoa, 2005; Shogren & Wehmeyer, 2020). This legislation reformed the school system, led to an increase in enrollment of students with disabilities in higher education (Menchel, 1995), and became a standard in other counties like Saudi Arabia, where the Regulations of Special Education Programs and Institutes became law (Alquraini, 2019). However, this begs the question, what had been the state of Deaf/HH students' education before this legislation in Saudi Arabia?

The history of Deaf/HH education in the Kingdom of Saudi Arabia is considered recent compared with other countries like the United States, where the first school for Deaf/HH students was established in 1817 in Hartford, Connecticut. In Saudi Arabia, if we follow the Deaf/HH education history, we will find that it has developed rather rapidly in the last 60 years. Back in 1964, Deaf/HH students' education started when the Ministry of Education established two elementary Deaf institutes in Riyadh city with 41 students attending from many regions of Saudi Arabia and the Middle East (Almousa, 1999). These two schools accepted all the students who could not be educated in public school due to their hearing loss, and segregated Deaf/HH students from hearing students. The teachers who taught Deaf/HH students were not specialized in Deaf/HH or special education and they depended mainly on the oralism method for communication. A few years later in 1971, an elementary Deaf institute for boys and girls was established in the Makkah region and what followed was a flourishing of elementary Deaf

institutes as they soon were founded in all regions of the Kingdom. In 1973, mid-high Deaf institutes started for both genders and in 1990, Deaf institutes at the high school level were established for both genders. In the same year, partial integration for Deaf boys began and in 1996, partial integration for Deaf girls began.

As a result of the success of partial integration of Deaf students in public schools, partial integration became the trend of Deaf/HH education, and several public schools opened their doors for Deaf/HH students in Saudi Arabia. The schools became known as inclusion schools. Over the years, the number of institutes and inclusion schools has astronomically increased (Almousa, 2005). Despite the focus of the Ministry of Education to spread education to all students in all regions, it is clear that these schools had an obvious increase for male students. The number of Deaf institutes and inclusion schools for boys is 255 schools with a total number of 4282 boys Deaf/HH students in the country. This was not the case for girls. AlKhashrami (2004) revealed two underlying causes for the increased number of male Deaf inclusion schools when compared to those for Deaf girls. The first reason was hearing students' parents who refused the idea of female Deaf inclusion students in their hearing children's schools. The second reason was the female Saudi teachers specializing in Deaf education who refused to move from Riyadh (where the special education department at KSU was the only department that prepare special education teachers at that time in Saudi Arabia) to other Saudi regions to work in inclusion schools for girls. As a result of the increased number of Deaf/HH students and the expansion of establishing Deaf institutes and inclusion schools, the era of the higher education for Deaf/HH students began in Saudi Arabia.

Higher Education of Deaf/HH Students in Saudi Arabia: Barriers to Success

The Kingdom of Saudi Arabia (KSA) is one of the first Arab countries to offer students with hearing loss access to higher education programs (Alrayes, 2014). In 2001, Deaf/HH students got royal approval from King Fahad to enroll in higher education institutions, especially technical colleges, across KSA to earn a university degree according to their aptitudes, tendencies, and abilities (Alrayes & Al-munaiei, 2014). Thus, in 2004, several universities and colleges in different regions in KSA started to accept Deaf/HH students. The College of Telecom and Information in Riyadh established the Department of Special Technology, and in the next year, expanded its acceptance for Deaf/HH students in Hail City and in Buraidah City. Arab Open University also started to accept male Deaf/HH students in Riyadh and two female-only colleges (The College of Education for Home Economics and Technical Education and The College of Education in Makkah al-Mukarramah) began to accept female Deaf/HH students. Disappointingly, these early attempts did not endure for long. Most of these facilitation programs continued for only one academic year, and then they were discontinued. Why did this happen? Higher education programs for Deaf/HH students at most of these universities did not continue to accept Deaf/HH students because they failed to anticipate the teaching methods and special services required for Deaf/HH students. For instance, Al-Khuzami (2008) reported that Umm Al-Qura University employed sign language interpreters in the second semester of accepting Deaf/HH students, but they did not even continue working until the end of the second semester due to administration issues with the university.

Unfortunately, there is a dearth of studies that explain the barriers that Deaf/HH students encountered at the previous university and the reasons that made these universities stop accepting Deaf/HH students. Using literature from the United States, we find that in general,

Deaf/HH students encounter several barriers that prevent them from continuing their post-secondary school. A barrier in this context refers to a rule or challenge that prevents or inhibits Deaf/HH students from completing their university studies. These barriers have been identified as falling into four major categories (Bisol et al., 2010; Foster et al., 1999; Hyde et al., 2009; Kermit & Holiman, 2018; Lukomski, 2007).

Academic Barriers. These are barriers that arise from professor teaching style, curriculum content, vast increases in the extent of new vocabulary at the university level, and the limited language preparation programs that Deaf/HH students can use to prepare themselves before they even take an academic course at the university. These barriers stem from the lack of experience of the instructors or their knowledge of Deaf/HH students' academic needs and how it affects their progress. This may manifest itself in the speed and structure of lectures by instructors and the specifics of teaching methodologies (Bisol et al., 2010). Teaching styles do not attune to deaf student needs such as constant moving in the classroom, which serves as a major distraction and disruption in the DEAF/HH learning process, to the point of where they are switching between the instructor and the interpreter and lose information in the process (Hyde et al., 2009; Lukomski, 2007). As this suggests, teaching style not only affects Deaf/HH students, but also involves support service quality of the interpreter. For example, lecturers who have different pronunciation, speak in a low or unclear voice, do not use a microphone when they teach in a large classroom, or talk without stopping or at a rapid rate make it difficult for the interpreters and the notetakers to perform their jobs to an effective standard (Bisol et al., 2010; Foster et al., 1999; Hyde et al., 2009; Kermit & Holiman, 2018).

Social Barriers. A social barrier is defined here as all interactions and relationships with hearing society in the university environment. Examples of social barriers are overt student

exclusion from social circles; labeling of Deaf/HH students without basis as inferior or disabled and not including them in conversations; negative social experience, discrimination, and attitudes toward Deaf/HH students in the informal settings and a lack of patience afforded to Deaf/HH student disabilities (Foster et al., 1999). The individual's sense of belonging with peers in the classroom, or on campus is a critical dimension of success when in college (Strayhorn, 2018). This sense of belonging can affect a student's degree of academic adjustment, achievement, aspirations, or even whether a student stays in school. Bisol et al. (2010) concluded that social interaction in post-secondary school is essential to increase the opportunities, accomplishment, and the success of Deaf/HH students. Fundamental and at issue to social barriers for Deaf/HH students is that they are accepted at universities without being prepared for the social dynamics required to interact successfully with hearing students, or the corollary, there is a lack preparedness for hearing students to understand Deaf/HH students, what their potentials are, the difficulties they face, and their needs (Bisol et al., 2010). Negative interactions between Deaf/HH students and hearing peers emerge from Deaf/HH students sensing that they are unwanted and unwelcome, thus adding to their sense of isolation. Moreover, Deaf/HH students are often unable to establish relationships with faculty and staff without the presence of the interpreter.

Support Services. Another barrier is the unavailability of the specialized support services that Deaf/HH students really need for academic success. These services include the availability and the technical ability (sign fluency) of interpreters who can sign, the availability of class notes or note-takers, and real-time captioning / voice-to-text (VTT) technologies (para-educators), sociologists, psychologists, and academic advisors.

Therein interpreters also play key roles in Deaf/HH students' success, as they are the main conduit or source of communication between Deaf/HH students and both instructors and hearing students (Kermit & Holiman, 2018). Foster et al. (1999) and Bisol et al. (2010) emphasized that interpreters themselves can be major barriers for Deaf/HH students when they are not available, thus leaving the Deaf/HH students lost in the class. Some Deaf/HH students leave the class when the interpreter is unavailable because they will be in an undesired situation. When surveyed, nearly 50% of Deaf/HH students mentioned the inferior skills, type (standard) of sign language used, and ability of interpreters to communicate class content as a major barrier with in-classroom services (Foster et al., 1999). Also, Foster et al. (1999) and Bisol et al. (2010) discuss the potential or capabilities of the interpreter of translating the class. Herein, the quality of the services provided to Deaf/HH students is, however, often insufficient to effectively deliver the class content. Whyte and Guiffrida (2008) showed that university counselors are meant to help guide student success and achievement. However, many of these very counselors have no knowledge or experience when it comes to Deaf/HH students. Also, university counselors can be limited in number if not non-existent (Foster et al., 1999).

Environmental Barriers. Environmental Barriers are related to the classroom, that is, the physical set-up, the lighting, the distance from interpreter. Studying in an environment that does not use or depends totally on visual communication creates challenges for Deaf/HH students (Bisol et al., 2010). The environment can reduce the degree of direct contact between the student and the instructor which makes it one of the main barriers for Deaf/HH students (Foster et al., 1999). When the instructor stands far from Deaf/HH students and loses eye contact with them, it causes the instructor to not get the feedback from Deaf/HH students as to if they are understanding the lesson or not. Also, some class settings do not help Deaf/HH students to

benefit from the lesson. For example, if there was a stage and the instructor was standing at a long distance and the interpreter in a different corner, this would distract the Deaf/HH students. Furthermore, room acoustics, size and configuration of the room, air conditioning, and ventilation and heating systems create acoustical challenges for those Deaf/HH students using hearing aids, as those frequencies become disproportionately amplified, rendering their hearing aids ineffective (Hyde et al., 2009). Compounding these effects, if there is a disarray of voices in group discussion, this can become chaotic for the students, if not confusing for the interpreters.

Additional Barriers in Saudi Arabia. In addition, the universities and the students share one other key obstacle to success: the low ability levels of Deaf/HH students to read and write (Alrayes, 2014) This means that Deaf/HH students were again disadvantaged at the beginning of the university studies in comparison to their hearing counterparts. The institutional representatives did not fully realize that Arabic is not the native language for Deaf/HH people. As mentioned, Dammeyer and Marschark (2016) and Alrayes (2006) describe how sign language is actually the L1 that Deaf/HH, and that they learn how to read and write in their country's language (as an L2) through sign language.

As a result of the novelty of the experience and the lack of knowledge of educating Deaf/HH students at the university level, especially regarding Deaf/HH students' literacy abilities in KSA and Arabian countries (Alsalem, 2018), the admission criterion for the Deaf/HH students in the previous programs was based only on the students' high school GPA, which was the only admission criterion used in all Saudi universities before 2003. The institutions made the students start their academic classes in the same learning environment as that of hearing students regardless of their academic preparation and language proficiency in Arabic. Though the other barriers mentioned undoubtedly played a part, I believe one of the most critical reasons that these

universities did not continue their programs was their failure to determine the literacy level of Deaf/HH students before they accepted them, thus setting the students up for failure by putting them in academic experiences they were unprepared for, especially with the absence of transition programs for them in high school.

Higher Education Program for Deaf and Hard of Hearing Students (HEP) at King Saud University (KSU)

Believing in its pioneering role in the education of persons with disabilities, KSU was keen to provide the opportunity for the Deaf/HH students to enroll in the university through the Higher Education Program for Deaf and Hard of Hearing Students (HEP). The preparation for accepting Deaf/HH students took three years through the formation of several specialized committees related to Deaf education, such as the Scientific Committee, the Curriculum Committee, and the Support Services Committee. Through this process, it avoided many of the obstacles that the other universities encountered through hiring professional sign language interpreters, note-takers, academic advisors, psychologists, and social workers. Not only that, but the school also trained the faculty members who were going to teach Deaf/HH students about Deaf education and Deaf/HH students' needs.

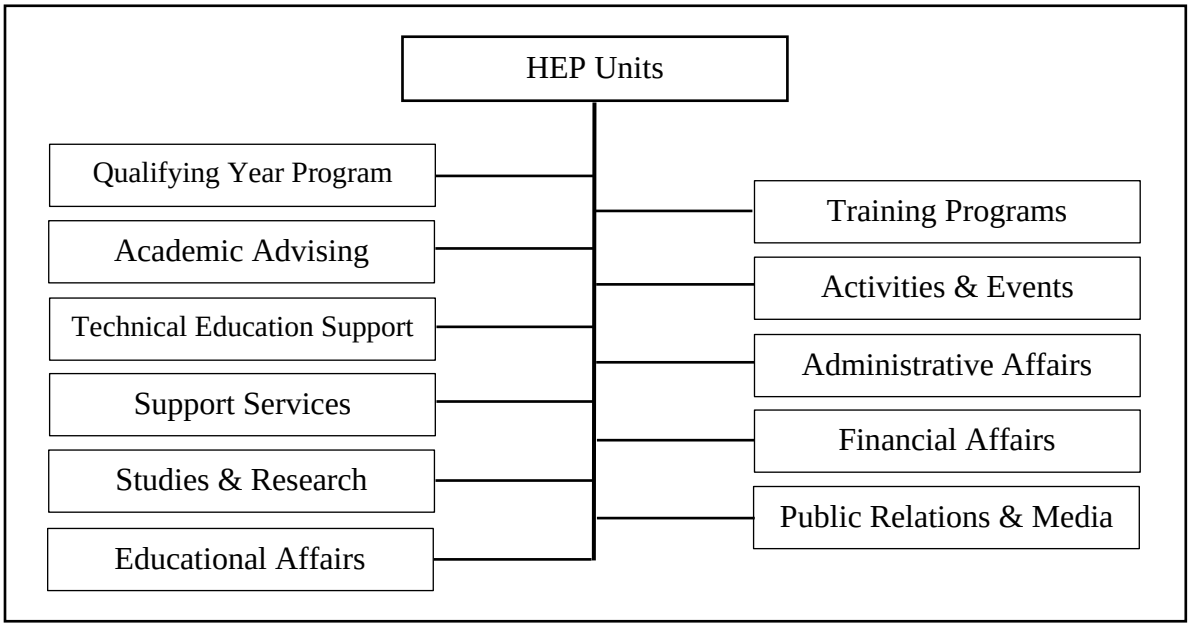
In contrast to the previous universities' admission criteria in Saudi Arabia, KSU kept in mind that the potential reasons that led to failing the previous universities that accepted Deaf/HH students were related to the barriers the students encountered and that in 2008, the government enacted The Convention on the Rights of Persons with Disabilities. Based on that convention, Deaf/HH students are not required to have an aptitude test score for university admission like that required for their hearing peers. Therefore, the HEP created its own Language Proficiency Test (LPT) in Arabic for Deaf/HH students. As well, they considered that Arabic language is not

the L1 of Deaf/HH students, their literacy level is below their hearing peers, and the absence of transition program for Deaf/HH students in high school and as a result, created the Qualifying Year Program (QYP).

The HEP provides many services to prepare Deaf/HH students through eleven units (see figure 2.1). The most important service the HEP provides is allowing for a one-year qualifying transitional program through the QYP for Deaf/HH students, which is considered the first of its kind in the Arab world. The QYP provides one year of intensive instruction in the Arabic language. As Arabic is their L2 and their literacy level on average is below their hearing peers (Alrayes, 2006; Alrayes, 2014; Alrayes & Al-munaiei, 2014; Alsalem, 2018), this instruction is necessary to improve the (Arabic language) literacy of these students. Through these efforts, KSU admitted Deaf/HH students during the academic year 2010 -2011.

Figure 2.1

The units of the Higher Education Program for Deaf and Hard of Hearing Students (HEP)



Note: These units are not organized in a hierarchical manner. Each unit has the same importance).

Criteria for Admissions to Universities in Saudi Arabia

Globally, universities' admission criteria differ from one country to another and even from one university to another in the same country. This difference is based on many factors, such as the number of applicants every year, capacity, reputation, long history, capability, financial resources, and national and global rank of the university. Therefore, some universities demand only a high school GPA for admission while other universities require the applicants to pass an acceptance test beside a high school GPA and other universities combine the high school GPA and high-stakes test scores. Universities' admission criteria could be defined as "Admission policies are the archetypal university gatekeeper policy as they govern selection into university" (Polesel & Freeman, 2015, p. 5). Though universities use different types of admission criteria, these criteria work as competition between applicants and aim to achieve fairness and equal opportunities for university admission and to predict the academic success of students. However, above and beyond all other considerations these tests should provide information about applicants' academic level.

High School GPA. For decades, in the Arab world, a high school GPA was the main admission criterion at all universities (Aldoghan, 1996; Hammoud, 2009; Al-Maqushi, 2001) except at King Fahad University in Saudi Arabia (Aldoghan, 1996). High school GPA was used alone as an admission criterion because it was believed that it is a good indicator of the students' performance. Supporters of using only high school percentage for university admission justify this with the following flawed logic: (a) the university is an extension of high school, and most of the tasks required in high school are similar to the ones at university, (b) the high school GPA is an outcome of measuring the student's performance in many various subjects, therefore the student's strengths and weaknesses can be known, (c) the high school GPA is the aggregate of

measuring the student's performance from several teachers, which gives it some of objectivity and stability, and (d) it is a very inexpensive measure to use (Aldoghan, 1996).

Due to relying only on high school GPAs, students' high school GPAs were artificially inflated because of the high competition between students, and that situation put the universities in a predicament to in deciding which students to accept (Al-Mohammadi & Al-Harbi, 2011; Hammoud, 2009). Thus, although the GPA degree required for admission to Arabian universities increased, students with high GPAs were not accepted into the majors they sought, and the usage of the high school GPAs criterion was not fair and did not give equal opportunities for university admission (Al-kharashi, 2021). Moreover, Al-Qataee and Al-Harbi (2018) observed that counting only on the high school GPAs could provide invalid indicators to universities about students' academic performance who graduated from different schools and geographic regions because high school GPAs reflect the standards and quality of a school or educational system, and these standards can be changed according to the geographical distribution of the region or school itself. The observations in this study regarding the schools' geographic differences corroborated the earlier findings of Jerio and Alzend (1989), who revealed that schools in small cities or rural areas might suffer from a shortage of teaching staff and educational pieces of equipment. Hence, these differences between schools cannot be shown in the high school GPAs.

Acceptance Tests. In order to resolve what was called the "High achievers' crisis" that emerged from the inflated high school GPAs, many universities began developing their own acceptance tests, especially for their highly demanded colleges and added them to their admission criteria in addition to the high school GPA (Alotaibi, 2020). According to Aldoghan (1996), these acceptance tests aimed to select the students who were capable of success, and to classify and place them into the majors that meet their abilities, and most importantly to predict

the students' academic success. Throughout this dissertation, the term 'acceptance or entrance test' will be used in its broadest sense to refer to non-standardized tests that are used by universities as one of the admission criteria, and they measure a specific set of applicants' skills that are used in the decision to accept the students or not. It seems that universities' acceptance tests had issues with achieving their purpose (selection, classification, placement, and predicting). There is a gap in the literature on the underlying reasons that pushed Saudi universities to use reliable and dependable admissions criteria other than entrance exams (Al-Qataee & Al-Harbi, 2018). Accordingly, we found that many researchers called for the need to use another dependable acceptance criterion without explaining or discussing the issues that surrounded the application of entrance tests (Al-kharashi, 2021; Al-Qataee & Al-Harbi, 2018). However, Alotaibi (2020), mentioned that there was a variation and increase in these tests.

We can infer from what Alotaibi revealed that the issue was related to achieving justice, fairness, and equal opportunities among applicants because I believe these acceptance tests did not achieve the purposes for which they were used. First of all, within the framework of these criteria that each university had its own united acceptance test for all its applicants, so they are not standardized and unified between universities that required these types of tests, and any information about their reliability and validity is unknown. Also, some universities, not all, were applying these acceptance tests because of the number of applicants, so students who lived in a lower-population region had a better chance to get accepted at the college that met their desire. To illustrate, if there were two students who had the same high school GPAs one from Riyadh, which has a high population, and the other one from a lower-population region, the second one would have a higher proportion to get accepted into the major he or she was seeking to enter at the university that located in his or her region and vice versa for the first students. I believe these

were the reasons that made the need to use another dependable acceptance criterion arise like standardized tests.

Standardized Tests. In 2000, the Saudi government founded the National Center for Assessment (Qiyas) to keep abreast of global developments in university admission standards and create better fairness and equal opportunities for university admission. Qiyas is an entity that is completely independent of the universities and its aim is to conduct standardized tests to measure the academic achievement of students applying for university studies and to predict their academic performance. It is like the College Entrance Examination Board (CEEB) organization that designs and supervises the test application of the Stanford Achievement Test (SAT) and the American College Testing organization that administers of the (ACT).

The standardized tests that Qiyas designed for university admission were the General Aptitude Test, which measures the analytical and inferential ability of the student, and the Academic Achievement Test, which measures the student's mastery of the courses studied in high school. In 2003, three universities added these tests to their admission criteria for only male students. After three years, in 2006, these two tests became one of the admission criteria in all Saudi universities for male students. In 2008, these tests were added to the female admission criteria for all the universities in the country. Since then, Saudi universities have depended on three criteria to accept hearing students in bachelor-degree programs: high school GPA, the General Aptitude Test score, and the Academic Achievement Test score. These criteria in aggregate, represent 100% of the acceptance score, though the method for calculating the acceptance percentage scores varies from university to university. For example, at King Saud University, the admission percentage is divided as follows: the high school GPA is 30%, the General Aptitude Test is 30%, and the Academic Achievement Test is 40%.

Criteria for Admissions to the HEP Program at KSU. The Scientific Committee at KSU set the admissions criteria for the HEP program, which consists of two elements: the applicant's score on the Language Proficiency Test (LPT) and their high school GPA percentile.

Language Proficiency Test. In 2008, the government enacted The Convention on the Rights of Persons with Disabilities. Based on that Convention, Saudi Arabia made changes in their educational approach to special education students. In Article number 24 "Education", the fifth section states:

"States Parties shall ensure that persons with disabilities are able to access general tertiary education, vocational training, adult education, and lifelong learning without discrimination and on an equal basis with others. To this end, States Parties shall ensure that reasonable accommodation is provided to persons with disabilities."

As a consequence of this law, the Saudi Arabia education system created a series of conventions or rights for people with disabilities, one of which applied to Deaf/HH students for "reasonable accommodation." As a result, Deaf/HH students are not required to have standardized tests (the General Aptitude Test and the Academic Achievement Test) like hearing students to achieve acceptance to the universities in Saudi Arabia according to this "reasonable accommodation". Perhaps due to this, the previous universities that accepted Deaf/HH students depended on the high school GPA as the only admission criterion as well.

In contrast, the HEP program at KSU followed a different path. In trying to ensure the success of Deaf/HH students at the university, the HEP created an LPT in cooperation with the Institute of Arabic Language at the university to measure the reading comprehension and writing ability of Deaf/HH individuals who want to gain entrance into the university. However, its function is not like the other LPTs that estimate the L2 ability of students. This LPT works as a

criterion for admission (a minimum score of 70% is required for admission) and most importantly as a potential predictor of the academic success for the Deaf/HH students at the academic preparatory courses in the QYP. More discussion of LPTs will occur later in this chapter.

High School GPA. The HEP at KSU, like all universities in Saudi Arabia, also uses the GPA of students in making admissions decisions. However, a controversial issue has been whether it is a good predictor of academic success or not. The question is, how reliable is the high school GPA as a predictor of academic success? On the one hand, some advocate for using high school GPAs as universities' admission criterion. From this perspective, high school GPAs have a high predictive validity of students' academic performance either alone, combined with acceptance tests or standardized tests (Aldoghan, 1996; Al-Najar, 2001; Kes, 1989). On the other hand, however, others argue that high school GPA has low predictive validity of academic success (Al-Thabiti, 1996; Alotaibi, 2020). Therefore, they emphasized not depending solely on high school GPAs as university admission criteria and called for using other admission criteria besides high school GPAs.

Based on the opposing results of the prior studies, I can say that there are some issues related to the predictive validity of the high school GPA for academic success. To begin with, even though the high school GPA was a good predictor of academic success in some studies, the high school GPA lost its predictive validity after the first year (Al-Qataee & Al-Harbi, 2018). Also, the high school GPA was a good predictor of academic success for some colleges, while it was not a good predictor of academic success for others (Aldoghan, 1996). Further, to gain a high predictive validity of academic success, the studies (Aldoghan, 1996; Al-Thabiti, 1996; Alotaibi, 2020) found that universities need to add additional admissions criteria to increase the

predictive validity of academic success, which means that depending only on high school GPA is not a valid predictor.

Moreover, I believe the results of the previous studies, which supported the use of high school GPA, might have been different if the statistical analysis had utilized binary logistic regression, like the current study (pass/ fail) instead of multiple regression (GPA) because, unlike linear regression, binary logistic regression lets us determine the "goodness-of-fit" of the model by assessing how well the set of variables predicts the categorical dependent variable, as well as the "predictability of the model." Furthermore, it provides us with an overview of the case classification accuracy, allowing us to determine how accurate this model/equation is at predicting future outcomes (Fritz & Berger, 2015).

In addition, it is essential to keep in mind that one of the major problems of the higher education of Deaf/HH students in Saudi Arabia is that it has started very recently and thus suffers from a scarcity of studies in this area. As a matter of fact, there is no study that has investigated the predictive validity of the admission criteria of Deaf/HH students in higher education whether in Saudi Arabia or any other Arab country. All the previous studies investigated the predictive validity of the high school GPA on hearing students. Therefore, for Deaf/HH students the predictive validity of the high school GPA on their academic success at the university is as yet unknown. However, we could learn some important points from the literature and first attempts of accepting Deaf/HH students in higher education.

The previous universities that accepted Deaf/HH students used the high school GPA as the only admission criterion. However, as shown prior, they failed to achieve success in higher education. One of the reasons for that might be because this admission criterion did not take into account the Deaf/HH students' academic abilities. For instance, Al-Khuzami (2008), revealed

that the female Deaf/HH students who got accepted at Umm Al-Qura University were the students who had the top ten high school GPAs in the entire country. This lets us ask, Does the use of high school GPA as an admission criterion fully reflect the Deaf/HH students' preparedness for the rigors of higher education?

To answer the prior question, we need to consider how Deaf/HH students are prepared in high school in Saudi Arabia. Saudi literature has agreed that even though the Saudi government protects the rights of students with special needs by including transition programs in special education legislation and regulations, in reality, there is a lack of operating transition programs for Deaf/HH students at the high school level (Alrayes & Alzahrani, 2014; Alshammari & Aldosari, 2021; Althebiani, 2019; Hanafi & Hamid, 2021). This means that in general, Deaf/HH students are unprepared for higher education, and the absence of transition programs that prepare Deaf/HH students for higher education might be another reason for the failure of the previous universities juxtaposed with the previously mentioned barriers Deaf/HH students encounter at universities.

Moreover, from a theoretical point, another issue related to using high school GPA only is that it does not reflect the students' academic abilities due to standards and quality differences from one school to another and from schools in one region to others (Al-Qataee & Al-Harbi, 2018; Jerio & Alzend, 1989; Kes, 1989). However, for Deaf/HH students, it is more complicated because it is not only the standards, quality, and geographic differences between schools but also the type of school that is meaningful. Is it a public school, inclusive school, or Deaf institute? Sadly, these issues caused the higher education initiative programs for Deaf/HH students to be stalled for many years until KSU started its own unique program.

Language Proficiency Tests in Arabic

Arabic Language

The Arabic language consists of 28 letters and writes from right to left and includes three different styles; Classical Arabic, Modern Standard Arabic, and colloquial Arabic (Khalaila, 2013). Most of the Arabic letters have three different shapes depending on the placement of the letter in the word (in the beginning, middle, or end) like (جـ ، ـجـ ، ـج). These include three letters that correspond to long vowel phonemes (alif, waw and ja), short vowel forms (FatHa, Damme, Kasra, double FatHa, double Damme, and the double Kasra), and four reading signs (Skoon, Shaddeh, Maddeh, Hamzeh) that are diacritics placed above or below the consonant letters and are not drawn at all in text designed for proficient readers (Taouka, & Coltheart, 2004).

Arabic is considered one of the most difficult languages to learn as a second language (Ryding, 2006). For example, there are 14 letters similar to each other (e.g., ب ت ث), and the only difference between them is the number of dots. Changing the number of dots, long vowel phonemes, or the short vowel forms lead to another meaning of the word. Another reason for difficulties with learning Arabic Language is the fact that one item or concept can have a myriad of words attached to it. For example, the concept “year” has 24 names, the concept “water” has 170 names, and the animals have names based on the gender like the male camel has 100 names, while the female camel has 255 names (Zidan, 2013).

Arabic language has a prominent place among the languages of the world because it is the holy language for almost a billion Muslims all over the world, the native language for all Arab countries, the second language of the Muslim world, the world's third largest language, one of the six languages in which United Nations documents are written (Amar, 2018; Salam, 2020), and most importantly, it is the language of the Holy Quran. The first word that Allah has

revealed to the Prophet Muhammad - Peace be Upon Him - is “Read”. That shows the importance of literacy in Muslim cultures and why success in reading and writing Arabic for Deaf/HH students is an important topic for investigation.

Language Proficiency Tests

In this study, it is necessary here to clarify exactly what is meant by language proficiency and Language Proficiency Test (LPT). Language proficiency refers to the capability of using an L2 (Arabic language) to comprehend and produce academic materials. Whereas LPTs could be defined as language tests that measure the reading and writing skills of L2 learners that provide the examiners with valid indicators of their Arabic proficiency. Butler and Hakuta (2006) believed, "There is no simple answer to how to conceptualize language proficiency and how to measure it" (p. 124). Graham (1987) and Luetke-Stahlman (1982) were surely right about language proficiency and its measurement because several studies have shown that there are many factors that contribute to the definition of language proficiency and LPTs (Halil & Minaz, 2019; Ryding, 2006).

International LPTs. There are several standardized LPTs that are used in different languages to measure language proficiency. For example, in English, the International English Language Testing System (IELTS), Test of English as a Foreign Language (TOFEL) and Test of English for International Communication (TOEIC), in French, the Test de Connaissance du Français (TCF), in Spanish, the Diplomas de Español como Lengua Extranjera (DELE), in German, the European Language Certificates (TELC) Deutsch, in Chinese, the Hànyǔ Shuǐpíng Kǎoshì (HSK), and in Japanese, the Japanese Language Proficiency Test (JLPT).

Arabic LPTs. Correspondingly, according to Al-Shatter (2019), and Sboaie, (2019), there are several tests to measure language proficiency in Arabic. Example of these tests are

Proficiency in Arabic Language Test (Qiyas), Proficiency in Arabic Language (Saudi Electronic University), the International Proficiency Exam for Arabic Language (Al-Najah National University), Ain Test to Measure Language Proficiency (Sultan Sharif Ali Islamic University), Examination of the International Certificate of Proficiency in the Arabic Language (Al-Tanal Al-Arabi Foundation), Al-arfan Arabic language test for non-native speakers, Arabic proficiency test (Arab-Academy), Proficiency Test in the Special Program for Teaching Arabic Language (University Maulana Malik Ibrahim, Malang, Indonesia), Arabic Language Proficiency Test (University of Leipzig, Germany), New York University Test to Measure the Proficiency of Arabic Language Learners (USA), Sprachcaffe Languages plus (Canada), American University test (Cairo, Egypt), and the Arabic language proficiency test (University of Jordan).

Even though the common goal of these LPTs is to estimate the extent of L2 mastery of the examinees through measuring the primary four skills of language proficiency (reading, writing, speaking, and listening), they differ in the language skills they measure. Some of these tests do not measure the four main skills, like the Arabic language proficiency test (University of Jordan) does not include any section that measures listening and speaking. Another test that does not measure listening and speaking but measures reading and writing besides grammar is the Sprachcaffe Languages plus (Canada) while other tests measure more than these four skills. For instance, Arabic proficiency test (Arab-Academy) measures syntax beside the four main skills. The New York University Test to Measure the Proficiency of Arabic Language Learners (USA) has sections to measure the translating ability from Arabic to English and English to Arabic.

KSU LPT for Deaf/HH Students. The LPT of Deaf/HH students at KSU is a secure admission test the HEP uses to decide who will be admitted to the HEP and the Qualifying Year Program (QYP). This test is divided evenly into two parts with a combined total score of 100.

The first part measures reading comprehension while the second part measures writing ability. The allocated time for each part is one hour with no break time between them. The reading comprehension part consists of eight sections with a total of 50 questions. All questions are multiple-choice with three response options. Each section of this part measures different background knowledge and skills such as: historical knowledge, vocabulary, vocabulary in context, and grammar. The last section measures reading comprehension skills and it is based on a one-paragraph reading passage. The writing part includes four questions about general topics, and the examinees are required to choose two questions to write about. A reliability analysis using Cronbach's Alpha was conducted by Zaino and his professors (2021) to examine the internal consistency of the eight subsections of this test. They found that the reliability of each subscale varied considerably and ranged between .10 to .63. Since none of the Cronbach's alphas were greater than .70 (acceptable internal consistency), the reliability was lower than the typical expectation (Nunnally, 1994). The overall reliability analysis of the entire test produced better, however, still relatively low reliability (Cronbach's $\alpha = .67$). Moreover, the results of difficulty and discrimination for some items were negative. According to Bandalos (2018), difficulty and discrimination could be defined as the following: Item difficulty is the proportion of respondents who answered an item correctly. Discrimination means being able to distinguish high-scorers from low-scorers. Being negative means that the results of an analysis of item difficulty were high which means that the proportion of respondents who answered an item incorrectly was more than the students who answered an item correctly. In regard to discrimination, it means the LPT results did not distinguish the high group from low group; the low group performed almost the same or better as the high group.

Validity of LPTs in Arabic. All of the LPTs examined so far differ in regard to investigating their validity. In general, validity is the most fundamental consideration in tests (O'Leary, 2017). Predictive validity has consistently been a primary concern among language test designers and test takers (Jin, 2011). Moreover, designers of standardized tests have the duty to: "construct instruments that meet professional standards; continue to investigate the properties of their instruments and the ensuing scores; and make test manuals, user guides, and research documents available to the public." (Chalhoub-Deville & Turner, 2000, p. 537).

In this context, we need to know the predictive validity of LPTs because they are tests that are being used to determine admissions criteria and presumably predict future performance (Farrall, 2012). To date, the validity and reliability of almost all the Arabic language tests is unknown (Al-Fawzan, 2020) because there is a scarcity of studies that have investigated these tests' validity, including the test developed at KSU. An initial pilot study of the KSU LPT (Zaino et al., 2021) indicates initial evidence of predictive validity, however a full analysis has not been conducted and this study found some problems. First, the pilot examination did not include all of the relevant variables such as GPA, the student's region, and gender. Moreover, they found that the LPT at KSU demonstrated difficulties with the cut score; only 10% of the Deaf/HH students met the standard percentage of acceptance (70% or more). Despite this, they still were accepted to the HEP, which means there is a wide range of scores among the students and the cut score is almost meaningless. 50% of the students who scored below the cut off still graduated from the QYP. Additional research examining the validity of the KSU LPT is needed to ensure it is a good test to use for admission criteria. As well, additional variables that could also be used in admissions decisions need to be examined. In particular, the region where students went to school is an important variable to include. Today, in the thirteen regions of Saudi Arabia, KSU,

located in Riyadh's capital city, is the only university accepting Deaf/HH students. There are potential differences in the high school experiences of students in different regions that potentially need to be taken into account.

Language Proficiency Tests and Academic Success

Universities around the world use different standardized LPTs as one of the screening and admission requirements for non-native speakers or L2 learners (Chalhoub-Deville & Turner, 2000; Neumann et al., 2019; Winke & Aquil, 2006). Likewise, this includes Deaf/HH students because they are considered bilingual/multilingual students. Their L1 is different from the one used at the university at which they are studying; that is, spoken and written Arabic in this case. Indeed, LPTs are believed to function as important indicators of the potential for academic success of L2 learners (Bichi et al., 2019; Graham, 1987; Neumann et al., 2019). Strassman et al. (2019) asserted that we could apply the findings of second-language learners' research on academic language with Deaf/HH students due to the common aspects between the two groups. Using this related research literature is also necessary because there is scarcity in the studies that covered this subject in regards to Deaf/HH students.

For decades, several studies investigated English L2 learners and showed that there is a significant correlation between L2 learner’s proficiency and academic success (Burgess & Greis, 1970; García-Vázquez et al., 1997; Ginther & Yan, 2018; Gue & Holdaway, 1973; Maleki & Zangani, 2007). This suggests that the increase of English L2 learner’s proficiency will lead to more scholarly capabilities to meet academic requirements. Thus, better performance in their academic courses will reflect in their success. Similarly, it applies to Deaf/HH students (Alsalem, 2018; Marschark, 1993). From a theoretical view, research has proved that the academic and social performance of Deaf/HH students of Deaf parents is better than Deaf/HH students of

hearing parents (Strong & Prinz, 2000). As mentioned earlier, Deaf/HH students of Deaf parents have a strong L1 (sign language) that helps them to learn an L2.

A few studies analyzed the correlation between L2 proficiency of Deaf/HH students and their academic success. Charrow and Fletcher (1974) conducted a study to analyze the performance of 13 Deaf youth students of Deaf parents and 13 Deaf youth students of hearing parents on two standardized tests; The Test of English as a Foreign Language (TOEFL) and Stanford Achievement Test (SAT). The subjects in the study used sign language as an L1 and English as an L2. The results of the study showed that Deaf students of Deaf parents have achieved higher scores on both tests compared to Deaf students of hearing parents.

In addition to these findings, Graham (1987) conducted a literature review that revealed that the results were varied in regard to the correlation between L2 proficiency and academic success; no correlation, weak correlation, and significant correlation. Graham observed that there are different issues that contributed to the variable results, mainly the L2 standardized tests that were applied.

As Graham's review shows, there is quite a bit of variation in the relationship between English L2 language proficiency and academic achievement. To put it succinctly, for nearly four decades, there has been disagreement between linguistics researchers who studied different L2 learners about how to define language proficiency and how to measure it (Butler & Hakuta, 2006; Luetke-Stahlman, 1982).

Past US and European research have shown that the LPT score is an important indicator of the likelihood of L2 learners achieving academic success because there is a significant correlation between L2 English learners' proficiency and academic success. Yet, despite the body of research, it remains unknown how the LPT functions with Deaf/HH students at KSU.

Moreover, up to now, the role that gender, hearing status, high school GPA, and school type play in Deaf/HH academic success is also unknown.

Notwithstanding, I agree with what the literature revealed, however, in the real world, LPTs function as a potential indicator of hearing L2 learners' academic success, and most importantly, provide information about the language proficiency level of the L2 learners. This is the reason why universities require L2 learners to have a certain score on LPTs. In contrast, it is unknown how the LPT functions with the Deaf/HH students at KSU. Is it effective in predicting academic success of the students in the HEP program?

The same LPT at KSU is used every year with prospective Deaf/HH university students. Therefore, before we use the LPT to understand students' incoming literacy levels, we should ascertain if it is a valid predictor of their subsequent academic success. This research is practical significant in that it is the first study to unfold the nature of the relation between the LPT and Deaf/HH student academic success at KSU and investigate what other potential variables could contribute to the Deaf/HH student academic success at KSU.

Purpose of This Study

The purpose of this study is to examine the LPT used with Deaf/HH students at King Saud University to determine the validity of the LPT as a mechanism for making admission decisions for Deaf/HH students at KSU. This test is used to determine whether students will be admitted to KSU and needs to have its validity examined. In particular, I will examine the predictive validity of the LPT used at KSU and the correlation between the school type, gender, hearing status, and high school GPA and academic success.

Research Questions

As a path to improving this complex situation for Deaf/HH students and specifically King Saud University Deaf/HH students, I address the following question:

1. After controlling for individual characteristics, including prior high school contextual factors, does the language proficiency test (LPT) uniquely predict whether students who are Deaf or HH pass King Saud University's Qualifying Year Program? In other words, what is the predictive validity of LPT for passing the QYP?
2. Which student characteristics moderate the relationship between the LPT and passing the QYP? For example, does the relation differ for students who are Deaf compared to students who are HH?

CHAPTER THREE

Research Method

The purpose of this chapter is to describe the methodology used in this study. This chapter details: (a) participants. (b) measures, which include the dependent and independent variables, and (c) data analysis plan.

Participants

The data source in this study came from the HEP for Deaf/HH students at King Saud University (*n* = 619; males= 311 [50.2%], females= 309 [49.8%]). These data were privately collected from 619 Deaf/HH students from 2011 to 2021 and included the Deaf/HH students who got accepted at the HEP at King Saud University and studied one academic year at the Qualifying Year Program (QYP). The students who were accepted at the KSU but dropped out of the QYP were excluded. The data were not clear about the number of male students who dropped out, but there was only one female student who dropped out. In general, the overall dropout rate of Deaf/HH students at KSU was over 50% (Alsalem, 2018). It follows that the dropout rate among female Deaf/HH students was almost nonexistent in comparison to male Deaf/HH students.

Measures

Dependent Variable

Academic Success (QYP Passing). I defined academic success in the current study as passing the QYP. This is different from other research literature which defined academic success as the students' first-year GPA. I chose passing the QYP because it is a gateway to further study at KSU. Only students who pass the QYP are eligible to continue on in their studies and earn a degree. The QYP courses at HEP are divided into two sequential instructional segments, one

segment per each semester. Each semester, the Deaf/HH students must take seven language classes that were designed for Deaf/HH students. In order to graduate the QYP, students must pass every class taken with a 60% or higher and attain a cumulative percentage of 60% as an average for two semesters. The dependent variable will be a binary categorical variable (pass = 1, fail = 0).

Independent Variables

The following independent variables will be included in the model: LPT score, high school GPA, type of school attended, hearing status, gender. In addition, cohort and region will be used as control variables.

Language Proficiency Test. The LPT is the focal predictor for the present study. It is a secure admission test that the HEP uses to determine if a student can be admitted to the HEP. Some professors also use it as a means to predict which students will pass the QYP, however this has not been tested yet. This test is divided evenly into two parts, with a combined total score of 100 points. The first part measures reading comprehension and vocabulary, while the second part measures writing ability. The allocated time for each part is one hour with no break time. The reading comprehension consists of eight sections with a total of 50 questions (all questions are multiple-choice with three response options) that measure different background knowledge and skills such as: historical knowledge, vocabulary, vocabulary in context, and grammar. The reading comprehension questions are based on a one-paragraph reading passage.

The histogram of the LPT scores (M= 38.77, SD= 18.75) is displayed in Figure 3.1. The scores were significantly skewed (positive), with the Shapiro Wilk test $W(620)= 0.96$, $p < .001$, indicating a deviation of a normal distribution. To investigate the LPT scores further, a new categorization was created based on existing acceptance criteria to HEP (see Table 3.1).

Specifically, LPT scores were categorized by participants who scored 70% or higher, which is the minimum requirements for acceptance at HEP, and those scores 69 or below. Notably, only 10.6% of participants had a score that met the acceptance requirements. When performing a crosstabulation and Chi-squared analyses on how the categorized LPT scores relate to Passing or Failing the QYP, an interesting pattern emerged. Specifically, there was a significant relation between LPT and Pass/Fail on the QYP, $X^2(df= 1)= 54.45$, $p< .001$, such that individuals who met the minimum requirement for acceptance (70% or higher on LPT) tended to pass (Pass $n=$ 64, 97%; Fail $n= 2$, 3.0%). Of the participants the scores below the minimum (69% or lower), a relatively equal number ultimately passed ($n= 272$,49.1%) and failed ($n= 282$, 50.9%) at QYP.

Figure 3.1

Histogram of the Language Proficiency Test (LPT) Scores

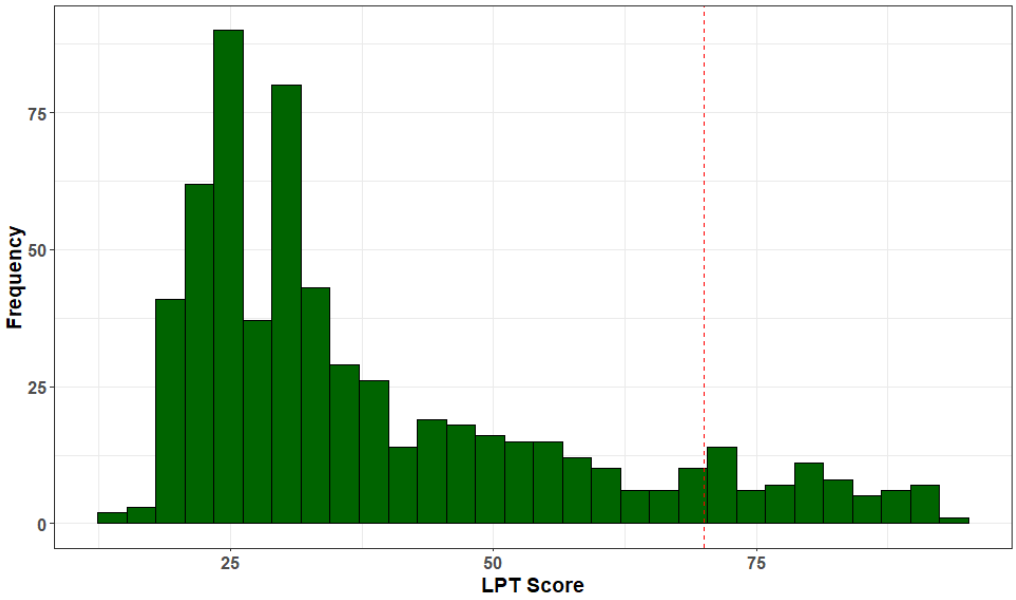


Table 3.1

Frequency of Participants by LPT Acceptance Score Requirements by QYP Pass/Fail

		QYP Pass/ Fail		
		≤ 69%	≥ 70%	Total
LPT Requirements	≥ 70% (Acceptance)	2	64	66
	(% Within QYP P/F)	(3.0%)	(97.0%)	(100%)
	(% LPT Requirements)	(0.7%)	(19.0%)	(10.7%)
	≤ 69% (Rejection)	281	272	553
	(% Within QYP P/F)	(50.8%)	(49.2%)	(100%)
	(% LPT Requirements)	(99.3%)	(81.0%)	(89.3%)
Total	LPT	284	336	619
	(% LPT Requirements)	(45.7%)	(52.3%)	(100%)

High school GPA. This score is based on individual participant's high school overall grade point average of all grades in all of the subjects the Deaf/HH students took. The high school GPA is commonly used in Saudi Arabia as part of the application file for hearing students and is used as part of the admission criteria for the HEP.

High School Type (Inclusive High School Status). Deaf education in Saudi Arabia includes three different types of high schools: Deaf institutes, inclusion schools, and public Inclusive schools. Whether students are enrolled at a particular type of school depends on two factors: the student's hearing status and the Saudi Arabian region in which the student lives. As described below, because Deaf institutes and public schools do not accept both students who are

HH and students who are Deaf, I will dichotomize student's high school type into a binary predictor with inclusive school = 1 (vs. non-inclusive school).

1) **Deaf Institutes.** These institutes accept only Deaf students, and they are located in Saudi regions that have high populations, like Riyadh, Makkah, and Eastern Region. Teachers at these institutes are special education teachers who have bachelor's degrees in Deaf/HH education. Moreover, Saudi sign language is the only communication and education method used with Deaf students.
2) **Inclusion Schools.** In this type of school, Deaf/HH students attend the same school as hearing students, but study in separate classrooms from them, either along with each other (Deaf and HH) or separately (one class for Deaf and the other one for HH students) depending on the population of the region where the school is located. Also, in these schools, Deaf/HH students are given the opportunity to integrate with their hearing peers in some classroom and extra-curricular activities and in the school facilities. The type of curriculum they study is public education curricula with accommodations. These types of inclusion schools accept Deaf students because in many Saudi regions, there is no Deaf institute for Deaf students. It is unknown what communication method is used for educating Deaf students because there is no study on this subject, however it is likely teachers and students use Arabic with some sign language. Despite its name, it is not the most inclusive type of schooling. In the U.S., this would not be described as an inclusive school.
3) **Public Inclusive Schools.** This category of school represents inclusive education and accepts only HH students, not Deaf students. HH students study within public education schools with hearing students in the same classroom and learn from general

education teachers. Also, they are provided with special education services like itinerant special education teachers and counselor teachers in special education. This is most similar to how inclusive schools in the U.S. are defined—diverse classrooms with HH students fully integrated into the general education classrooms.

Gender (Female status). In Saudi Arabia, the educational system (whether in school levels or universities) is segregated between male and female students. The male and female Deaf/HH students have the same admission criteria and LPT. Although they study the same courses subjects, curriculum, and scoring criteria at the QYP, they have different exams for the midterms and finals. To put it in a different way, the male instructors use different midterm and final questions than used in the female department and vice versa. This independent variable will be analyzed as a binary variable (Female = 1).

Cohort Year. I am using data from eleven cohorts of the Deaf/HH students who gained acceptance at the HEP, starting from the First cohort of students in 2011 to the eleventh cohort in 2021. Each year's cohort of students will be identified by their year and the cohort year will be analyzed as a continuous predictor. The size of each cohort varies by year.

Hearing Status (HH status). Students' hearing status will be taken into account in all analyses. Importantly, the University's QYP contains two sections: the Deaf section and the HH section. In the Deaf section, Saudi sign language is the primary communication method. Not all students in this section are Deaf, however, since it also includes HH students that depend on sign language for communication and education. In the HH section, spoken Arabic is the main language used for communicating and education. This section includes only the HH students who depend on hearing aids and use spoken Arabic. In the records and dataset, therefore, students' status will be based on section placement rather than their actual hearing status. The

Deaf participants comprise 43.7% (*n* = 271) of the sample, while HH students were 56.3% (*n* = 349). This independent variable will be analyzed as a binary variable (HH = 1).

Region. In the proposed study, the region students are from will be treated as a random effect and included in two ways. First, the LPT scores per each region and second, the proportion of inclusive schools per region. According to the Royal Order No. (1/92), dated 3/2/1992, the Kingdom of Saudi Arabia is divided into (13) administrative regions. Each one of them is divided into a number of governorates differentiating in number from one region to another with a total of (118) governorates that include a different number of cities, villages, and rural areas. Moreover, the thirteen administrative regions are classified into two categories according to the population and availability of services, as the regions include the category (A) governorates and category (B) governorates. This administration division aims to raise the level of administrative work and development in the regions of the Kingdom by defining the supervisory scope, which has a significant impact in defining the governing responsibility of the governorate. Prior to attending the HEP, students came from 12 regions across Saudi Arabia with Riyadh (*n*= 358, 57.7%), Eastern Region (*n*= 99, 16.0%), and Makkah (*n*= 66, 10.6%) accounting for the majority of students (84.3%). Notably, no students came from the Albaha region.

Region is an important variable to include because there are systematic differences in the educational opportunities in each region for Deaf/HH students. Special education schools for Deaf/HH students are available in all the regions in KSA. However, the availability of the type of schools might vary from one region to another. For instance, Deaf institutes are not available in all the regions in KSA. In some small villages and rural areas, there are no inclusion schools for Deaf/HH students. As a result, Deaf/HH education at elementary and mid-high levels is forced to depend on itinerant special education teachers. Additionally, Deaf/HH students at the high school

level who live in these areas often must travel a considerable distance on a daily basis or even move to another city or village to be able to enroll in one of the Deaf/HH special education schools.

Data Analysis

Multilevel modeling (MLM) is one method for analyzing data that are hierarchically situated (also known as "clustered" or "nested" data); other methods for handling hierarchical data include applying OLS regression on aggregated variables at Level 2 (L2), generalized estimating equations (GEEs), and unilevel regression with either cluster-robust standard errors or design-effect adjusted standard errors (e.g., Huang, 2016). Compared to the other approaches, MLM allows for better statistical power than analyzing aggregate data, better statistical inferences than aggregated data, and is the most flexible modeling approach in most situations (e.g., Bell & Jones, 2015). For the proposed study, a 2-level random intercept with students (L1) nested in region (L2) MLM was used to evaluate the research questions. For ease of results interpretation, all continuous predictors were standardized into *z*-scores (e.g., LPT), and all categorical variables were effect-coded (e.g., hearing status). The model I tested was as follows.

$$\text{Logit(Pass QYP)}_{ij} = \gamma_{00} +$$

$$\gamma_{01}*\text{ZLPT\_CMC}_{ij} +$$

$$\gamma_{02}*\textit{ZHSGPA\_CMC}_{ij} +$$

$$\gamma_{03}*\text{InclHighSch}_{ij}$$

$$\gamma_{04}*\text{Female}_{ij} +$$

$$\gamma_{05}*\text{CohYear}_{ij} +$$

$$\gamma_{06}*\text{HH}_{ij} +$$

$$\gamma_{07}*\text{LPT\_CMC}_{ij}* \textit{ZHSGPA}\text{\_CMC}_{ij} +$$

$$\gamma_{08}*\text{LPT\_CMC}_{ij}*\text{InclHighSch}_{ij} +$$

$$\gamma_{09}*\text{LPT\_CMC}_{ij}*\text{Female}_{ij} +$$

$$\gamma_{10}*\text{LPT\_CMC}_{ij}*\text{CohYear}_{ij} +$$

$$\gamma_{11}*\text{LPT\_CMC}_{ij}*\text{HH}_{ij} +$$

$$U_{0j}$$

In the model above, the log-odds of passing the college's Qualifying Year Program (QYP) for the i^{th} individual student in the j^{th} education region is a function of the conditional grand mean likelihood of passing the exam (γ_{00}) plus the main effects of language proficiency and other student characteristics (within region) ($\gamma_{01} - \gamma_{06}$), plus the moderating effects of student characteristics on the relationship between language proficiency and likelihood of passing the qualifying exam ($\gamma_{07} - \gamma_{11}$), plus education region differences in the mean log-odds of QYP (U_{0j}). All data analyses were implemented in *R* with full maximum likelihood using the lme4 package (Bates et al., 2015).

CHAPTER FOUR

Results

The primary purpose of this study was to investigate the predictive validity of LPT for passing the QYP after controlling individual characteristics: cohort year, gender, hearing status, high school percentile GPA, and school type. A second purpose was to investigate the interaction between LPT scores and individuals' characteristics in the former variables. As a result, the following research questions were formulated:

Research Question 1: After controlling for individual characteristics, including prior high school contextual factors, does the language proficiency test (LPT) uniquely predict whether students who are Deaf or HH pass King Saud University's Qualifying Year Program (QYP)? In other words, what is the predictive validity of LPT for passing the QYP?

Research Question 2: Which student characteristics moderate the relationship between the LPT and passing the QYP? For example, does the relation differ for students who are Deaf compared to students who are HH?

Descriptive Statistics Results

Zero-Order Correlations

Table 4.1 presents the zero-order correlations between the 13 different variables used in the multilevel models. The mean rate of passing the QYP (outcome) was 54%, which was significantly different from zero. A statistically significant correlation was found in 44 of the 78 unique comparisons, resulting in a 54% correlation rate. The highest positive correlation coefficient was (r = .93) between regional HH student enrollment and regional LPT scores. Whereas the lowest negative correlation coefficient was (r = -.81) between regional HH students' enrollment and regional high school GPA.

Table 4.1

Zero-order Disaggregated Correlation across Variables Used in Multilevel Models Analysis

Variable	*M*	*(SD)*	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
Outcome															
1. QYP Status (1=pass)	0.54	(0.49)	--												
Predictors															
2. Region Mean Cohort Year (years)†	6.08	(0.72)	**.15**	--											
3. Region Female Students Enrolled (%)†	0.49	(0.18)	**.13**	**.58**	--										
4. Region HH Students Enrolled (%)†	0.56	(0.17)	**.18**	**.77**	**.61**	--									
5. Region Mean High School GPA (points)†	92.84	(1.80)	**-.14**	**-.53**	**-.75**	**-.81**	--								
6. Region Students from Inclusive High Schools (%)	0.50	(0.08)	.06	.05	**-.13**	.05	**.21**	--							
7. Region Mean Language Proficiency (LPT) (points)	38.78	(3.86)	**.17**	**.70**	**.49**	**.93**	**-.74**	**.16**	--						
8. Student Cohort Year (Diff from Mean) (years)	0.00	(3.09)	-.02	.00	.00	.00	.00	.00	.00	--					
9. Student Female Status (1=yes)	0.49	(0.50)	**.22**	**.22**	**.38**	**.23**	**-.28**	-.05	**.18**	.04	--				
10. Student HH Status (1=yes)	0.56	(0.49)	**.33**	**.27**	**.21**	**.35**	**-.28**	.02	**.32**	**.15**	.03	--			
11. Student High School GPA (Diff from Mean) (points)	0.00	(6.68)	**-.09**	.00	.00	.00	.00	.00	.00	-.04	-.06	**-.40**	--		
12. Student High School Inclusive Status (1=yes)	0.48	(0.50)	**-.19**	.01	-.02	.01	.04	**.17**	.03	**.22**	**-.21**	**.10**	**.23**	--	
13. Student LPT (Diff from Mean) (points)	0.00	(18.36)	**.45**	.00	.00	.00	.00	.00	.00	**.09**	.09	**.44**	**-.31**	**-.24**	--

Note. N = 619 Deaf/HH students within 12 regions; any acronyms for outcomes/predictors here; categorical variables are dummy coded. M = Mean, SD = Standard Deviation.

† variables that were not included in the model, but are presented for descriptive purposes only.

*$p < .05$, ** $p < .01$, *** $p < .001$.

Multilevel Model Results

In order to answer research question one, I ran three models: Model 1, which includes only level 2 (region) predictors; Model 2, which includes level 1 (students characteristic) predictors; and Model 3, which includes both level 1 and level 2 predictors.

Model 1: Region Predictors

Model 1 includes the level 2 (region) variables. The results from this model (see Table 4.2) suggested that the intercept estimate indicated that the average likelihood of students passing the QYP was -0.21 logits (which translates to a mean predicted probability of 44.83% of students passing the QYP), which is not significantly different from zero logits (which is a predicted probability of 50%). Also, if we look at the results of this model, we will find that the Level 2 (region) school inclusivity rate (i.e., the proportion of schools in the region that were inclusive of Deaf/HH students) was not significantly related to students passing the QYP ($p > .05$). However, there was a significant relationship between level 2 (region) LPT and the likelihood of passing the QYP. For each standard deviation increase in a region's mean LPT scores, there was a predicted increase of 0.53 logits in the likelihood of students passing the QYP, all else held constant. (Another way of interpreting this is that the odds of passing the QYP for students from a region that is +1 *SD* above average on the LPT was predicted to be 1.70 times greater than the odds of passing the QYP for students from a region with average LPT scores). The predicted probability of students from a region with higher (+1*SD*) LPT scores passing the QYP was 58%**.**

Table 4.2

Multilevel Logistic Regression Model Results for Passing the QYP

	Model 1 (L2 Predictors)					Model 2 (L1 Predictors)					Model 3 (Model 1 + Model 2)					Model 4 (Model 3 + Interactions)				
Fixed Effects	*Coeff*	*SE*	*Z*	*p*	*OR*	*Coeff*	*SE*	*Z*	*p*	*OR*	*Coeff*	*SE*	*Z*	*p*	*OR*	*Coeff*	*SE*	*Z*	*p*	*OR*
Intercept (Mean)	-0.21	(0.16)	-1.32	.187	0.81	**0.33**	**(0.11)**	**3.00**	**.003**	**1.39**	0.24	(0.19)	1.28	.201	1.27	0.20	(0.19)	1.06	.289	1.23
Region HS Inclusive % (Z)	0.23	(0.26)	0.90	.366	1.26						**0.67**	**(0.30)**	**2.24**	**.025**	1.96	**0.66**	**(0.31)**	**2.17**	**.030**	1.94
Region LPT (Z)	**0.53**	**(0.13)**	**3.93**	**<.001**	**1.70**						**0.34**	**(0.17)**	**2.00**	**.046**	**1.41**	0.36	(0.19)	1.94	.052	**1.44**
Student Cohort (Z)						-0.12	(0.11)	-1.13	.258	0.89	-0.11	(0.11)	-0.98	.328	0.90	-0.01	(0.12)	-0.05	.964	0.99
Student Female (1=yes)						**0.49**	**(0.10)**	**4.88**	**<.001**	**1.63**	**0.46**	**(0.10)**	**4.51**	**<.001**	**1.59**	**0.43**	**(0.12)**	**3.60**	**<.001**	**1.54**
Student HH vs. Deaf (1=HH)						**0.64**	**(0.12)**	**5.34**	**<.001**	**1.89**	**0.55**	**(0.13)**	**4.22**	**<.001**	**1.74**	**0.47**	**(0.16)**	**3.01**	**.003**	**1.60**
Student HS GPA (Z)						**0.49**	**(0.12)**	**4.09**	**<.001**	**1.63**	**0.48**	**(0.12)**	**3.89**	**<.001**	**1.61**	**0.43**	**(0.13)**	**3.34**	**.001**	**1.54**
Student HS Inclusive (1=yes)						**-0.34**	**(0.11)**	**-3.00**	**.003**	**0.71**	**-0.38**	**(0.12)**	**-3.25**	**.001**	**0.69**	**-0.38**	**(0.13)**	**-2.92**	**.003**	**0.68**
Student LPT (Z)						**1.30**	**(0.16)**	**7.96**	**<.001**	**3.65**	**1.38**	**(0.17)**	**7.99**	**<.001**	**3.99**	**1.29**	**(0.38)**	**3.39**	**.001**	**3.63**
Student LPT*Region HS Inclusive																-0.25	(0.52)	-0.48	.634	0.78
Student LPT*Region LPT																0.08	(0.33)	0.23	.817	1.08
Student LPT*Student Cohort																0.25	(0.16)	1.56	.119	1.29
Student LPT*Student Female																-0.10	(0.17)	-0.60	.550	0.90
Student LPT*Student HH																-0.23	(0.21)	-1.08	.282	0.80
Student LPT*Student HS GPA																-0.28	(0.18)	-1.53	.125	0.75
Student LPT*Student HS Inclusive																-0.03	(0.18)	-0.19	.851	0.97
Model Fit																				
Approximate R^2	0.04					0.48					0.50					0.51				
BIC	860.60					684.40					686.20					725.50				
Deviance (-2LL)	834.90					633.00					621.90					616.20				

Note. N = 619 students within 12 regions; Any acronyms for outcomes/predictors here; metrical predictors are standardized in z -scores and categorical variables are effect coded. *SE* = standard error, *OR* = odds ratio, calculated as the exponentiated coefficient. HS = high school, LPT = language proficiency test, Cohort = cohort year, HH = hard of hearing. Approximate R^2 calculated as the fitted variance divided by the sum of the fitted, region variance plus 3.29 (variance of the logistic distribution). Model estimated using the lme4 package in *R*. All values in logits.
*$p < .05$, ** $p < .01$, *** $p < .001$.

Model 2: Student Predictors

This model includes level 1 (students) predictors. Based on the results of this model (see Table 4.2), the intercept estimate indicated that the average likelihood of passing at the QYP was -0.33 logits (which translates to a mean predicted probability of 58% of passing the QYP), which is significantly different from zero logits (which is a predicted probability of 50%).

A curious finding was that there was a significant difference between males and females in their likelihood of passing the QYP; specifically, female students were predicted to be 0.49 logits higher than average (and 0.98 logits higher than males; we double the coefficient to find the difference between groups because of our use of effect coding), holding all else constant. In other words, the odds of female students passing the exam were 2.66 times greater than the odds of passing for males, adjusting for other predictors in the model. This means the predicted probability for female students passing the QYP was 69%, whereas the predicted probability for male students for passing was 46%

Interestingly, when examining the Deaf and hard of hearing (HH) population, there was a significant difference between students who were HH and students who were Deaf in their likelihood of passing the QYP. Students who were HH were predicted to be 0.64 logits higher than average in the likelihood of passing the QYP (and 1.28 logits greater than students who were Deaf; we double the coefficient to find the difference between groups because of our use of effect coding), all else held constant. In other words, the odds of HH students passing the QYP were 3.60 times greater than the odds of passing for a student who was Deaf, adjusting for other predictors in the model. In other words, the predicted probability for HH students passing the QYP was 72%, whereas the predicted probability for Deaf students passing was 42%.

Perhaps unexpectedly, students' high school GPA, within region, was significantly related to the likelihood of passing the QYP. Specifically, for each standard deviation increase in students' high school GPA, the likelihood of passing the QYP was 0.49 logits greater, all else held constant. Another way of thinking about this was that the odds of passing the QYP for a student from a relatively higher ranked high school GPA was 1.63 times higher than the odds of passing for students from an average-ranked school, adjusting for other predictors in the model. Put simply, the predicted probability of students from higher ranked high schools (+1 *SD*) passing the QYP was 69%.

A related discovery was that there was a significant difference in the likelihood of passing the QYP between schools that were inclusive of both HH/Deaf students compared to schools that enrolled only HH or Deaf students. Specifically, students who attended inclusive schools were 0.34 logits lower than average in their likelihood of passing the QYP (and 0.68 logits lower than students who attended exclusive schools; we double the coefficient to find the difference between groups because of our use of effect coding), holding all else constant. In other words, the odds of students who attended inclusive schools were less likely to pass the QYP and had 0.51 times the odds of passing than students who attended a school that was focused only on HH or Deaf students, adjusting for other predictors in the model. In other words, the predicted probability of students who themselves attended an inclusive school passing the QYP was 50%, whereas the predicted probability for students who attended an exclusive school (i.e., for HH or Deaf students only) passing was 66%.

As may not have been expected, students' LPT scores, within their region, was significantly related to the likelihood of passing the QYP. Specifically, for each standard deviation increase in students' LPT scores, there was a predicted increase of 1.30 logits in the

likelihood of passing, all else held constant. In other words, within a given region, the odds of students with higher LPT scores passing the QYP was 3.67 times higher than the average odds of passing, adjusting for other predictors in the model. In other words, the predicted probability of passing the QYP for students with relatively high LPT scores (+1 *SD*), within region, was 84%. As an aside, students' cohort year, within their region, was not significantly related to the likelihood of students passing the QYP ($p > .05$).

Model 3: All Predictors (level 1 and 2)

In contrast to models 1 and 2, this model includes level 1 and 2 predictors. The results of this model (see Table 4.2) reported that the intercept estimate indicated that the average likelihood of passing at the QYP was 0.24 logits (which translates to a mean predicted probability of 56% of passing the QYP), which is not significantly different from zero logits (which is a predicted probability of 50%). As previously, students' cohort year, within their region, was again not significantly related to the likelihood of students passing the QYP ($p > .05$).

In contrast, there was a significant relationship between level 2 (region) LPT and the likelihood of passing the QYP. For each standard deviation increase in a region's mean LPT scores, there was a predicted increase of 0.34 logits in the likelihood of students passing the QYP, all else held constant. (Another way of interpreting this is that the odds of passing the QYP for students from a region that is +1 *SD* above average on the LPT was predicted to be 1.41 times greater than the odds of passing the QYP for students from a region with average LPT scores). The predicted probability of students from a region with higher (+1 *SD*) LPT scores passing the QYP was 58%**.**

Additionally, there was also a significant relationship between level 2 (region) school inclusivity rate and the likelihood of passing the QYP. For each standard deviation increase in a region's percentage of schools that are inclusive, there was a predicted increase of 0.67 logits in the likelihood of students from that region passing the QYP, all else held constant. (Another way of interpreting this is that the odds of passing the QYP for students from a region that is +1 *SD* above average in the percentage of schools that are inclusive was predicted to be 1.96 times greater than the odds of passing the QYP for students from a region with an average percentage of inclusive schools). In other words, the predicted probability of students who are from a region with a higher percentage of inclusive schools (+1 *SD*) was 71%**.**

The pattern of findings from Model 2 were replicated in the combined model, Model 3. There was a significant difference between males and females in their likelihood of passing the QYP; specifically, female students were predicted to be 0.46 logits higher than average (and 0.92 logits higher than males; we double the coefficient to find the difference between groups because of our use of effect coding), holding all else constant. In other words, the odds of female students passing the exam were 3.18 times greater than the odds of passing for males, adjusting for other predictors in the model. The predicted probability for female students for passing was 67%, whereas the predicted probability for male students for passing was 45%.

There was a significant difference between students who were hard of hearing (HH) and students who were Deaf in their likelihood of passing the QYP.; Students who were HH were predicted to be 0.64 logits higher than average in the likelihood of passing the QYP (and 1.28 logits greater than students who were Deaf; we double the coefficient to find the difference between groups because of our use of effect coding), all else held constant. In other words, the odds of HH students passing the QYP were 3.60 times greater than the odds of passing for a

student who was Deaf, adjusting for other predictors in the model. The predicted probability for HH students for passing was 69%, while the predicted probability for Deaf students for passing was 42%.

The students' high school GPA, within region, was significantly related to the likelihood of passing the QYP. Specifically, for each standard deviation increase in students' high school GPA, the likelihood of passing the QYP was 0.48 logits greater, all else held constant. Another way of thinking about this was that the odds of passing the QYP was student from a relatively higher ranked high school GPA was 1.62 times higher than the odds of passing for students from an average-ranked school, adjusting for other predictors in the model. In other words, the predicted probability of students from higher ranked high schools (+1 *SD*) passing the QYP was 67%.

As well, the finding in Model 2 that there was a significant difference in the likelihood of passing the QYP between schools that were inclusive of both HH/Deaf students compared to schools that enrolled only HH or Deaf students was maintained. Specifically, students who attended inclusive schools were 0.38 logits lower than average in their likelihood of passing the QYP (and 0.76 logits lower than students who attended exclusive schools; we double the coefficient to find the difference between groups because of our use of effect coding), holding all else constant. In other words, the odds of students who attended inclusive schools were 0.47 times the odds of passing for students who attended a school that was focused only on HH or Deaf students, adjusting for other predictors in the model. In other words, the predicted probability of students who themselves attended an inclusive school passing the QYP was 47%, whereas the predicted probability for students who attended an exclusive school (i.e., for HH or Deaf students only) passing was 65%.

Finally, similar to Model 2, students' LPT scores, which were only measured within their region (not across regions), were significantly related to the likelihood of passing the QYP. Specifically, for each standard deviation increase in students' LPT scores, there was a predicted increase of 1.38 logits in the likelihood of passing, all else held constant. In other words, within a given region, the odds of students with higher LPT scores passing the QYP was 3.99 times higher than the average odds of passing, adjusting for other predictors in the model. In other words, the predicted probability of passing the QYP for students with relatively high LPT scores (+1 *SD*), within region, was 84%.

Model 4: All Predictors and 2-way LPT Interactions

In order to answer research question two, 2-way interactions between LPT scores and levels 1 and 2 predictors were incorporated into Model 3, to create Model 4.

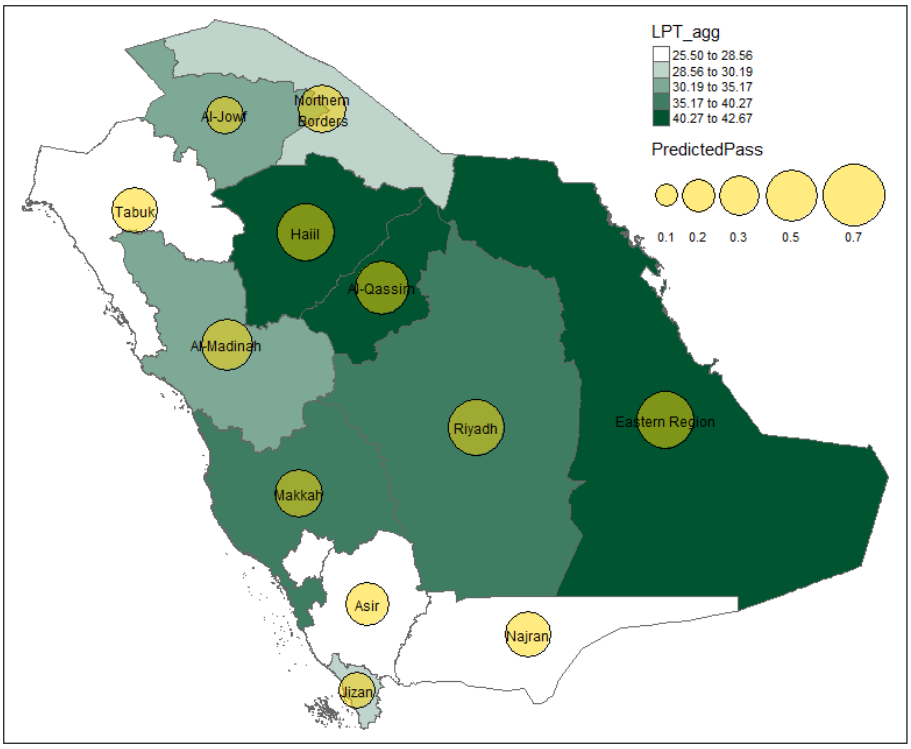
Based on the results of this final model (see again Table 4.2), it was found that the intercept estimate indicated that the average likelihood of passing at the QYP was 0.20 logits (which translates to a mean predicted probability of 55% of passing the QYP), which is not significantly different from zero logits (which is a predicted probability of 50%).

Student and Region LPT Effects. The pattern of results in Model 3 was mostly replicated in Model 4. Students' individual-level, but not region-level, LPT scores were significantly related to the likelihood of passing the QYP. Specifically, for each standard deviation increase in students' LPT scores, there was a predicted increase of 1.29 logits in the likelihood of passing, all else held constant. In other words, within a given region, the odds of students with higher LPT scores passing the QYP was 3.63 times higher than the average odds of passing, adjusting for other predictors in the model. That is, the predicted probability of passing the QYP for students with relatively high LPT scores (+1 *SD*), within region, was 82%.

Perhaps most interestingly, none of the 2-way LPT interactions was significant (*p*s > .05). This means that the positive effect of students' LPT (within their region) on the likelihood of passing the QYP was not moderated by any of the other predictors in the model (*p*s > .05). And, although Level 2 (region) mean LPT scores was not technically significantly related to the likelihood of students passing the QYP ($p > .05$), the *p*-value was quite close to the traditional alpha level ($p = .052$). Thus, because students' LPT scores were predictive of QYP passing status, and because there were regional differences in LPT scores (but not any significant moderators), for results visualization purposes, I created a heat map overlaying LPT region averages (across all cohorts) with the probability of passing the QYP (see Figure 4.1). In the figure, darker green represents higher mean LPT region values, and larger beige circles represent higher mean region QYP passing probabilities.

Figure 4.1

Aggregate LPT and QYP Passing Rates by Region



As can be seen, regions that had the highest LPT averages were the Eastern Region, Al-Qasim, and Hail, whereas Tabuk, Asir (which also tended to have higher QYP passing rates), and Najran regions had the lowest LPT averages, and tended to also have lower QYP passing rates.

Other Predictor Effects. Like the previous models, Model 4 showed that there was a significant relationship between level 2 (region) school inclusivity rate and the likelihood of passing the QYP. For each standard deviation increase in a region's percentage of schools that are inclusive, there was a predicted increase of 0.66 logits in the likelihood of students from that region passing the QYP, all else held constant. (Another way of interpreting this is that the odds of passing the QYP for students from a region that is +1 *SD* above average in the percentage of schools that are inclusive was predicted to be 1.94 times greater than the odds of passing the QYP for students from a region with an average percentage of inclusive schools). In other words, the predicted probability of students who are from a region with a higher percentage of inclusive schools (+1*SD*) was 70%.

When comparing males and females, there was a significant difference between the two in their likelihood of passing the QYP; specifically, female students were predicted to be 0.43 logits higher than average (and 0.86 logits higher than males; we double the coefficient to find the difference between groups because of our use of effect coding), holding all else constant. In other words, the odds of female students passing the exam were 2.36 times greater than the odds of passing for males, adjusting for other predictors in the model. In other words, the predicted probability for female students passing the QYP was 65%, whereas the predicted probability for male students for passing was 44%.

Regarding the HH and the Deaf population, there was a significant difference between students who were HH and students who were Deaf in their likelihood of passing the QYP. Students who were HH were predicted to be 0.47 logits higher than average in the likelihood of passing the QYP (and 0.94 logits greater than students who were Deaf; we double the coefficient to find the difference between groups because of our use of effect coding), all else held constant. In other words, the odds of HH students passing the QYP were 2.56 times greater than the odds of passing for a student who was Deaf, adjusting for other predictors in the model. In other words, the predicted probability for HH students passing the QYP was 66%, whereas the predicted probability for Deaf students passing was 43%.

From the previous attempts of accepting Deaf/HH students that used high school GPA as the only admission criterion, high school GPA has been shown to decrease the predictive validity of academic success. However, as may not have been expected, students' high school GPA, within region, was significantly related to the likelihood of passing the QYP. Specifically, for each standard deviation increase in students' high school GPA, the likelihood of passing the QYP was 0.43 logits greater, all else held constant. Another way of thinking about this was that the odds of passing the QYP was student from a relatively higher ranked high school GPA was 1.54 times higher than the odds of passing for students from an average-ranked school, adjusting for other predictors in the model. In other words, the predicted probability of students from higher ranked high schools (+1 *SD*) passing the QYP was 65%.

In relation to inclusivity, there was a significant difference in the likelihood of passing the QYP between schools that were inclusive of both HH/Deaf students compared to schools that enrolled only HH or Deaf students. Specifically, students who attended inclusive schools were 0.38 logits lower than average in their likelihood of passing the QYP (and 0.76 logits lower than

students who attended exclusive schools; we double the coefficient to find the difference between groups because of our use of effect coding), holding all else constant. In other words, the odds of students who attended inclusive schools were 0.47 times the odds of passing for students who attended a school that was focused only on HH or Deaf students, adjusting for other predictors in the model. In other words, the predicted probability of students who themselves attended an inclusive school passing the QYP was 46%, whereas the predicted probability for students who attended an exclusive school (i.e., for HH or Deaf students only) passing was 64%.

CHAPTER FIVE

Discussion

This dissertation aimed to examine how Language Proficiency Test (LPT) scores, cohort year, gender, hearing status, high school GPA, and school type between and within regions, predict the academic success (pass/ fail) of Deaf/HH students in the Qualifying Year Program (QYP) at King Saud University.

The results of this dissertation revealed that after controlling for cohort year and including predictive level 2 variables (region, average LPT by region, proportion of inclusive schools per regions) and level 1 variables (gender, hearing status, and high school GPA), several factors were predictive of passing the QYP. To summarize, students with higher LPT scores, students from regions with a higher proportion of inclusive schools, women, students who were hard of hearing, and who had a higher GPA were more likely to pass the QYP. In contrast, students who attended inclusive schools rather than those just focused on Deaf or HH students were less likely to pass the QYP. As well, there were no student factors that moderated the findings; all of the 2-way interactions with students' LPT were not significantly related to the likelihood of students passing the QYP.

Implications

Language Proficiency Test Scores

Predictive Validity of Individual Student Scores within Region. Results showed that the LPT score, within a given region, is a significant predictor of academic success among KSU students who got accepted at the HEP and studied one academic year in the QYP. That is, the Deaf/HH students who had higher scores on the LPT were predicted to be significantly more likely to pass the QYP than the students who had lower scores in the test. The method of

defining academic success in the current study is associated with passing the QYP and came in different from the literature that associated academic success with the students' first-year GPA. Even though the approach of defining the academic success of the current study differs from the method in the literature that associated academic success with the students' first-year GPA, the academic success speaks for itself. This measure of success means that eventually the students will be able to move forward into further academic studies at KSU. In addition, apart from this slight discordance, the results of the study substantiate previous findings in the literature on the significant correlation between English L2 learner's proficiency and academic success (Burgess & Greis, 1970; Ginther & Yan, 2018; García-Vázquez et al., 1997; Gue & Holdaway, 1973; Maleki & Zangani, 2007). Moreover, the results of this study support the hypothesis asserted by Strassman and colleagues (2019) that we could apply the findings of L2 learners' research on academic language to Deaf/HH students based on the similarities between L2 learners and Deaf/HH students.

Lingering Concerns Related to the LPT. Despite the fact that the LPT at KSU is a significant predictor of academic success, which was one of the unexpected findings, and is in line with previous literature, this test may need additional work to be more effective. First, the test has low reliability. Zaino et al. (2021) revealed that the reliability of the reading part of LPT was lower than the typical expectation (.70) after examining the internal consistency of the eight subsections of the reading part. Moreover, they showed that the results of an analysis of item difficulty were high which means that the proportion of respondents who answered an item incorrectly was more than the students who answered an item correctly. Further, they proved that the test items' discrimination was low. That means the LPT results did not distinguish high group from low-group; the low group performed almost the same or better as the high group. As well,

the writing part lacked a rubric for scoring. This made the students' score different from one instructor to another because it depended on the instructor who corrected it, making the scores very unreliable.

Second, the LPT is difficult for Deaf/HH students. Only about 10% of the examinees met the acceptance minimum score (70% or more). These results reflect those of Zaino and his professors (2021), who also found that the LPT is difficult for Deaf/HH students. Specifically, they found that almost 10% of the accepted Deaf/HH students at the QYP fulfilled the required admission criterion related to LPT. Further, based on the prior results, I believe that the cut score of acceptance (70%) needs to be reexamined because nearly half of the students who did not satisfy the acceptance minimum score and were nonetheless accepted at the university still passed the QYP.

Third, content validity is one of the most fundamental considerations in test development (O'Leary et al., 2017). It gives us real indicators about the accuracy of the test in measuring the purpose for which it is designed. Moreover, it directs the development of the test by evaluating the questions: what questions are working, what are not working, and what do we need to change in the test. The validity of the LPT, however, may be questionable because the reading section contains questions including general history and Islamic information/ knowledge. Also, the reading section includes a grammar section that measures short vowel forms (FatHa, Damma, Kasra, double FatHa, double Damma, and the double Kasra) and four reading signs (Skoon, Shaddeh, Maddeh, Hamzeh) that are diacritics placed above or below the consonant letters and are not drawn at all in-text designed for proficient readers since they are used in formal speaking. These kinds of questions did not align with the target reading skills that the test was created for (reading comprehension).

Fourth, there is a concern about the fairness of the test. Again, universities depend on these types of tests to make the critical decision of whether to accept applicants or not based on their scores. Bobeshet and Al-Ghamdi (2015) disclosed that students believe that they need to prepare in advance for the different university acceptance tests because they know their academic future depends on achieving satisfactory scores. Hamp-Lyons (1989) assured that it is imperative that students prepare for the types of questions they will be asked and develop effective strategies for taking the test in order to maximize the use of the available time. However, Deaf/HH applicants did not have any idea about the LPT they were going to take at KSU. Most importantly, it seems that the concept of the LPT is highly new for them, and that is reflected obviously in some of the students' answers. They did not answer on the answer sheet but rather on the test papers, while other Deaf/HH students wrote the actual chosen answer on the answer sheet instead of writing the letter that represented the answer.

While the LPT did predict who will pass, it does not provide important information about the examinees who took the test. The QYP is a preparatory intensive Arabic language program for Deaf students. The instruction and curriculum in this language program are unified at a particular language level for all accepted Deaf/HH students. However, the instructors at the QYP have no clear idea about the language level of the Deaf/HH students who are going to teach them because the LPT did not provide them with any information about the weakness and strengths points of their language levels. At the same time, the instructors are required to follow the study plan related to the curriculum. This would explain why almost 50% of the accepted students fail to pass the QYP. Therefore, the LPT lost the purpose of utilizing it as one of the admission criteria. This finding broadly supports the work of other studies in this area that universities'

acceptance tests had issues with achieving their purpose; selection, classification, placement, and predicting (Aldoghan, 1996).

Regional Effects

LPT Mean Scores in Students' Home Region. There was no significant relationship found between regional mean LPT scores and the likelihood of a student passing the QYP. This might be due to the sample distribution between regions. According to Snijders and Bosker (2011), it is important to note that the reliability of an aggregated variable is dependent on, among other things, the number of micro-level (students) units in a macro-level unit (regions). If we look at the sample, we will find that almost over half of the students who got accepted at the university came from Riyadh region, where the university is located. In contrast, Al-Baha region did not have a single student represented. That is, no Deaf/HH student qualified to enter the QYP.

In addition, though the results were not significant (slightly above the accepted *p* value), they provide some indications about the regional effect on the LPT scores associated with passing the QYP. Some regions had higher mean LPT scores compared to other regions. This result may be related to the higher quality of education for Deaf/HH teachers' instruction in these high schools in comparison to other regions. To illustrate, the specialized training programs in Deaf education provided in the region and, most importantly, the university that the teachers graduated from may be two specific factors that impact the mean LPT scores across the regions. In the 2018-2019 academic year, the Ministry of Education stopped the acceptance of bachelor's degrees in colleges of education of Saudi universities and that includes special education programs. This policy change was implemented in order to compel all colleges of education to reform their bachelor's degrees programs. Another fact that might affect the teachers' preparation

is the number of teachers who obtain a Master's or Ph.D degrees. Not all Saudi Universities offer graduate programs of Deaf education. Special education teachers who live in the regions or near the regions that have universities that offer higher education have a higher opportunity to obtain graduate degrees in Deaf education.

Proportion of Inclusive Schools among Regions. There was a significant relationship between level 2 (region) school inclusivity rate and the likelihood of passing the QYP. That means students who graduated from a region with a rate of inclusive schools that is one standard deviation higher than the mean, would be predicted to have a higher probability of passing the QYP than students from a region with an average percentage of inclusive schools. This finding agrees with the finding of Al-Qataee and Al-Harbi (2018) and Jerio and Alzend (1989). I believe the population size of the regions might hold the main potential explanations for that, which is as following:

1) Specialized Teachers. Inclusive schools located in big regions with high populations have higher number of specialized teachers in Deaf education, which allows Deaf/HH students to have a better opportunity to expand their academic experience from a variety of teachers. Moreover, special education teachers who live in the regions or near the regions that have universities that offer higher education have a higher opportunity to obtain graduate degrees in Deaf education. These universities are always located in big cities with high populations.

2) Parents. Parents of Deaf/HH students who live in big cities in big regions have, most often, higher education due to the labor jobs requirements compared to parents who live in rural areas, villages, or small cities. Thus, they have a higher socioeconomic status. Further, they have a better chance to access special education services whether these services were governmental (free of charge) or private.

3) Age of Identification. The age of hearing loss identification varies from one city to another. Deaf neonates born in big cities in Saudi Arabia have a better chance of having their hearing loss identified in the first days. Hospitals in big cities that located in big regions use newborn and infant hearing screening (Alyami et al., 2016) and are equipped with advanced machines. For example, while the average age of diagnosis within Saudi Arabia is unknown (Alqahtani, 2017) due to a lack of screening in many communities (Alyami et al., 2016), the average age of hearing loss identification in one of the big cities, Jeddah, located in the west of Saudi Arabia, is 5.5 months (Habib & Abdelgaffar, 2005). Therefore, Deaf/HH children outside of the large cities generally are identified at school age (Alqahtani, 2017; Alqarni, 2017).

Inclusive Schools

In contrast to the finding related to region, the results of this study indicated that students who attended a school that enrolled only HH or Deaf students were more likely to pass the QYP than those students who attended an inclusive school (accepts Deaf/HH).

These findings need to be interpreted with caution due to the different nature of each type of school and the language level between Deaf and HH students and between HH students themselves. The first potential reason for these results is communication methods whether between the teachers and students or students themselves. For those schools who serve HH students in public schools or Deaf students who study in Deaf institutes, the communication method is very clear. Spoken Arabic language is used with HH students and Saudi sign language is used with Deaf students. In contrast, the communication modalities at inclusive schools are unclear. The Deaf/HH students who study at inclusive schools have partial integration classes. This means that they study either along with each other (Deaf and HH) or separately (one class for Deaf and the other one for HH students) depending on the population size of the region

where the school is located. However, we do not know how the teachers of Deaf/HH students in these types of schools communicate with their students and what education methods they follow. Do they use sign language with Deaf students, while the oralism method with HH students? Or do they utilize one communication method from the previous methods with their students?

Second, another potential explanation is the limited linguistic environment that Deaf/HH students often experience in inclusive schools compared to HH students who study in public schools or Deaf students who study in Deaf institutions. In inclusive schools, Deaf/HH students integrate with their hearing peers in some classroom and extra-curricular activities and in the school facilities. On the other hand, HH students who study in public schools with special programs, study with their hearing peers all the time. Thus, they have the opportunity to communicate and make relationships with their hearing peers. Deaf students who study in Deaf institutions have the opportunity also to communicate with their peers in the entire school. Therefore, they have a better chance to improve their language level (whether it was Arabic or sign language) than the Deaf/HH students who study in inclusive schools.

A third possible explanation for these results is the curricula. Even though the curricula in all types of schools for Deaf/HH students are united, there are some essential differences. The curricula that Deaf students study in Deaf institutions are adapted and accommodated for them. At the same time, in public schools, HH students study the curricula without any adaptation and accommodation. However, in inclusive schools, it is unknown what the curricula of Deaf/HH students look like. Also, it is unknown if the teacher provides some adaptations and accommodations of the curricula exclusively for Deaf students or inclusively for both students.

Hearing Status

The most unsurprising finding to emerge from the results is that hearing status is a significant predictor of academic success and the results of this study are in good agreement with Delage and Tuller (2007) and Nelson and Crumpton (2015). Students who are hard of hearing were more likely to pass the QYP than those who are Deaf. This underlines how students' educational experiences and language development are affected by their hearing loss. Generally, Deaf/HH children's needs in the areas of communication and language acquisition are heavily influenced by the parents' perceptions and how they regard the issue of hearing loss from the beginning (Dunst et al., 2008; Powell & Dunlap, 2010). Saudi hearing parents want their children with hearing loss to use the Arabic language for communication and to share their Saudi culture (Alqarni, 2017). As a result, parents of children with hearing loss focus more on the oralism method for communication and education and this will benefit mainly HH students. Furthermore, this finding thus needs to be interpreted with attention to which school they studied at because as mentioned earlier HH students studied in public schools with hearing peers have a higher chance to develop their Arabic language than Deaf students enrolled in Deaf institutions (segregation programs). This is because Deaf students had limited access to the spoken Arabic language. In general, HH students who study in general-education schools have better scores on Language tests (Reich et al., 1977).

Gender

The findings indicated that gender is a significant predictor of academic success. This indicated that female Deaf/HH students are predicted to be more likely to pass the exam than male students. Herein, this is also a new finding that has not been reported in the literature. The factor responsible for this result may be the available opportunities to continue higher education

in the Kingdom of Saudi Arabia for female Deaf/HH students compared with the males. King Saud University (KSU) is the only university in Saudi Arabia that accepts Deaf/HH students from both genders (Alsalem, 2018). I believe females students put more effort into studying, are more eager to invest their potential, and because they knew that they have limited opportunity to continue their higher education like male students. Not only that but also a limited chance to join the labor market compared to male students who graduate from high school due to family overprotection. Another critical point is that female students' education started always after male students, therefore, they try to prove themselves. Furthermore, if we return to the results, we will find that the number of male students who came from outside of Riyadh region was almost more than the double of female students.

High School GPA

High School GPA is a good predictor of whether a student will complete the QYP. This means that in concert with the LPT, it works well to determine who is likely to succeed and who is not. The KSU requires a particular high school GPA combined with an LPT score for acceptance. While this is important, it should not be interpreted as suggesting that high school GPA can serve as the only admissions criterion. This is a fundamental point because the literature proved that the predictive validity of using the high school GPA as the only admission criterion did not correspond to academic achievement (Al-Thabiti, 1996; Alotaibi, 2020). Moreover, it was obvious from the first failed attempts that previous HEPs. In addition, in this study, when the high school GPA merged with LPT scores, the findings show that students' high school GPA, within region, was significantly related to the likelihood of passing the QYP. Specifically, the odds of passing the QYP for students from a relatively higher ranked high

school GPA was higher than the odds of passing for students with low high school GPA. This lends support to previous findings in the literature (Aldoghan, 1996; Al-Najar, 2001; Kes, 1989).

Limitations

While this study had many new findings related to important variables related to success in the KSU Qualifying Year program, there are a few limitations to the findings that limit their generalizability. The first limitation includes the distribution of the sample size. This study used multilevel modeling because of its nature (students nested within regions). Due to the location of KSU, almost more than half of the accepted students attended from Riyadh region. Moreover, there are no accurate statistics about the population of Deaf/HH individuals in Saudi Arabia. Therefore, it is unclear what Deaf/HH students who live in other regions did or do after they finish high school.

Other limitations are related to the limited nature of the data that informed it. The data collection was based on the students' records which included the region they came from, type of school, hearing status, gender, high school GPA, and LPT scores. However, the students' records did not include any information about the history of hearing loss of the students' childhood, such as the time of hearing loss identification and language acquisition. Also, it is unknown if the students had early intervention services in their childhood for language acquisition. Further, we do not know about the hearing status of the students' family members; if they belong to hearing or Deaf/HH parents, or if one of the family members has hearing loss. Finally, it is unclear what communication methods the students' parents used with them as they grew up. All these potentially important predictors are challenging to collect from the sample due to seven cohorts that graduated from the university.

The last limitation exist in this study was related to documenting Deaf education history in Saudi Arabia, which affect our knowledge about regions and female Deaf/HH students. Even though Deaf education history was documented, it was surrounded by gaps in its details. It would be very beneficial to know how the sequence of establishing Deaf institutes and inclusion schools in Saudi regions and how many students they have. Also, it would be beneficial to know the sequence of establishing schools for Deaf/HH students at all school levels and gender. This leads us to wonder if the percentage of female Deaf institutes and inclusion schools affected the number of their enrollment in schools. Having this information will give us indicators about the development of Deaf/HH education and how it affected their higher education. Most importantly, it will provide some explanations about why there were a few students who came to KSU from certain regions.

Recommendations

Broadly, further work needs to be carried out on the LPT at KSU. First, the reliability of the existing test is demonstrated to be problematic (Zaino et al., 2021). This needs to be addressed. Second, additional work on the content validity of the test is needed because the tasks included in the reading section do not match the demands found in the QYP. Validity is the most fundamental consideration in test development (O'Leary et al., 2017). It gives us actual indicators about the accuracy of the test in measuring the purpose for which it is designed. Third, the usefulness of the existing 70% cut score is in question. Given that 50% of the students who did not reach the cut score still passed the QYP, additional work examining the cut score is needed. Therefore, I strongly suggest that the LPT should be replaced with a new test concentrating only on measuring the reading comprehension of Deaf/HH students who seek to continue their post-secondary education at KSU. As part of this replacement of the LPT, it will

be crucial to create a rubric for the writing section. In fact, the HEP must pilot the new test and measure its reliability and validity and determine the correct cut score before applying it to the Deaf/HH students. This essential step will provide a piece of necessary information such as to what extent the test items provide us with information related to the Deaf/HH students' language proficiency level. Besides, it directs the development of the test items by evaluating the questions; what questions are working, what questions are not working, and what do we need to change in the test.

As well, KSU is a leading university in the nation, and its experience of accepting Deaf students is successful. Therefore, we need to keep in mind that sooner or later, other universities in different regions in the Kingdom of Saudi Arabia will establish their higher education program for Deaf/HH students due to the increased number of Deaf/HH students who seek to continue their higher education. KSU will be a model for other universities. Hence, they will develop their own LPTs, and by doing that, we will return to the era when some of the highly demanded Saudi universities created their own non-standardized acceptance test and fell into issues with achieving their purpose (selection, classification, placement, and predicting).

Moreover, the LPT should be standardized and unified for all universities seeking to accept Deaf students designed and supervised via the National Center for Assessment (Qiyas). Therefore, I believe using the LPT as one of the admission criteria at the HEP should be reevaluated. That is, the LPT should not work as the main criterion for the students’ admission, rather it should work as a diagnostic and placement test to determine the language proficiency level of Deaf/HH students which can then be used to determine the correct curriculum for them.

Furthermore, the test accommodations must be available to the students before they take the test; this includes sign language interpretation for the directions, extended time for the test,

using a microphone for HH students, and break time between the reading and writing tests. Furthermore, to prepare the Deaf/HH students for the test, an orientation workshop should be conducted one day prior to the test. Following this process, the students will feel more prepared and relaxed to take the test.

In relation to the female Deaf/HH students, the vision (2030) of the Kingdom of Saudi Arabia concentrates on empowering women by giving them more capabilities and enabling them to strengthen their future and contribute to the development of Saudi society and economy. The HEP as an educational institution can participate in this vision by expanding the acceptance of Female Deaf/HH students. Hence, I call for the establishment of more Higher Education Programs for female Deaf/HH students in different cities in Saudi Arabia to give them the same available educational opportunity that male Deaf/HH students have to continue their higher education. A suggested way to do that is through separating the QYP unit from the HEP. The reason for that is the HEP is logistic support services while the QYP is an Arabic intensive language program.

Finally, 12 years has passed since the HEP was established, and the dropout percentage among the students is not clear, especially between the male Deaf/HH students which is believed to be more a lot more than the female Deaf/HH students. As a result, a study should be conducted to investigate the dropout percentage and its underlying reasons. Also, it is critical to conduct a qualitative regional study to investigate what and where Deaf/HH students go in all Saudi regions after finishing high school.

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