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Understanding The Experiences Of A Group Of Yemeni Students In An Esl Science Class

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by

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DEDICATION

This research project is dedicated to my wonderful husband, family, and friends, who fully supported me in my quest for higher education. To my loving husband, Jonathon Akroush, whose endless support, words of encouragement, and patience while I worked tirelessly day after day were essential to the completion of this project. To my mother, Nada Fradi, who instilled in me the value of education and guided me throughout this process. To my friends, who understood when I told them I could not partake in social events due to deadlines and infinite pages of writing. They have been my cheerleader, my confidante, and my shoulder to cry on. Thank you for believing in me and encouraging me throughout this journey. A special feeling of gratitude goes to my in-laws, for their love and support.

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CHAPTER 1 INTRODUCTION

As the American society becomes more racially and ethnically diverse, its school systems are experiencing an increasing number of minority students whose native language is not English. Statistics from the United States Census Bureau confirm that immigrants to the United States during the 1980's represented greater ethnic, racial, and socioeconomic diversity than at any time earlier in this century. Since the 1970's, the number of Arab American immigrants in the US has also increased dramatically due to political turmoil, war conflicts, and poverty.

According to US Census data (2013a), since the early 1990s, students whose native language is not English are the fastest growing student population group in US schools. This diverse student group has grown two and a half times faster than the general student population, an increase from 100% to 300% over the past decade alone. In fact, the EBL student population reached over 3 million students in 2000, an increase of a million since 1994 and representing roughly 6.7 percent of the total student population (National Center for Educational Statistics, 2013). The projected growth for 2015 is expected to surpass the total EBL student population of 2000 (National Center for Education Statistics, 2014).

In the state of Michigan the EBL student population has grown more than 40 percent in the last ten years (National Center for Education Statistics, 2014). The United States Census Bureau (2015) reported that the state of Michigan had over 876,000 residents who spoke a language at home other than English. This number accounted for 10% of the state's total population. The city with the highest population of Arab-Americans in Michigan is the city of Dearborn, where over 26.9% of the citizens are foreign born and roughly 46.8% of the population in this city speaks a language at home other than English (United States Census Bureau, 2015).

Additionally, the United States Census Bureau reported in 2014 that over 70,000 students enrolled in Michigan public schools were born to foreign parents whose native language was not English. Of these 70,000 students, 10% were enrolled in high school and almost 20% of them did not graduate from high school. Also, the Census Bureau reported that over 41,000 of Michigan students enrolled in primary and secondary schools were foreign born and their native language was not English. All of these statistics do not take into account the number of children born to illegal immigrants or illegal immigrants themselves who are enrolled in the public school system. Therefore, the total number of children born to foreign parents and foreign born students is believed to be higher than the figures reported.

A variety of terms is used to denote students whose native language is not English, including Limited English Proficiency (LEP), English Language Learners (ELL), English as Second Language (ESL) (Herr, 2007), and more recently Emergent Bilingual Learners (EBL) (Garcia, Kleifgen, & Falchi, 2008). The Institute of Education Sciences of the US Department of Education defines English Language Learners (ELL) as: "Individuals who were not born in the United States or whose native language is a language other than English; and therefore have sufficient difficulty speaking, reading, writing, or understanding the English language" (Herr, 2007, p. 24). For the purpose of this study, EBL will be used to refer to students whose first language is not English. This classification will include students who are also referred to as LEP, ELL, ESL and English as a Foreign Language (EFL). The reason the term EBL is used for this study is based on recent research that points out that prior terms used to denote these students, such as the ones previously mentioned, imply a deficiency model and EBL better reflects the status of such students, as they develop knowledge and skills in the English (Garcia, Kleifgen, & Falchi, 2008). According to Garcia, Kleifgen, and Falchi (2008), "when officials and educators ignore the bilingualism that these students can and often must develop through schooling in the

United States, they perpetuate inequities in the education of these children" (p. 6). In other words, it is assumed that their needs are the same as monolingual children, and thus disregard their home language and cultural backgrounds.

By the time EBL students enter US schools, many of them have experienced other education systems in their country of origin, which may differ from the US school system in the age at which children begin school, subjects taught, methods of instruction, discipline approaches, ethos of schools, and resources available in schools. According to Orwell (1993), some children may have experienced fairly harsh educational regimes in their native countries and are pleased to find that US teachers do not slap children or use a stick as approaches to classroom management. However, these children still encounter challenges adapting to a new language and culture. As a result, it is important that teachers appreciate the diversity of EBL students' backgrounds, prior experiences, and have an understanding of their sociolinguistic entity.

Statement of the Problem

As the EBL student population continues to increase, concerns have been expressed that schools might not be addressing their unique needs in order to help them succeed academically. When EBL students enter school, they often struggle with different rules that govern their native language versus those governing the second language. EBL students frequently have difficulties with sentence structure, syntax, grammar, mechanics, coherence, and cohesion. These students tend to associate grammatical, mechanical, linguistical, and syntaxical structures of the native language with the second language (Krashen, 1987). This transference technique creates challenges in the second language because rules that govern the native language do not ordinarily govern the second language (NETC, 2005). This struggle with language occurs not just in

English, but in many core curriculum subjects, particularly in science, as cognitive and linguistic demands they face in literacy become increasingly challenging.

Science education not only requires EBL students to read but to consider reading as a multifaceted developmental process that requires the student to successfully make connections between language, print, and thought (Warren, 1994). Here, the term "thought" includes the student's conceptual framework, which has been shaped by experience, education, and culture. Due to science texts' complex reading, EBL science students struggle in language development as well as in competence of concept building and critical thinking skills required in science inquiry. According to Okhee Lee (2010), English language learners struggle to develop competence as they engage in the science curriculum. The challenges they face "involves the disconnection between their own cultural knowledge and science disciplines, and between the primary discourse in the home and community and secondary discourse in school" (Lee, 2010, p. 466). This is a challenge because EBL standards require that students use English in socially and culturally appropriate ways (Fathman & Crowther, 2006). One such way is the academic talk of science which includes the concepts and cognitive skills necessary to participate in scientific communities.

Purpose of the Study

As the EBL student population continues to increase, it is vital for teachers and educational institutions to become familiar with their EBL students' difficulties as they struggle to acquire skills in a new language and culture. Furthermore, such awareness needs to result in an increase in the number and type of educational accommodations needed to help EBL students succeed academically as they undergo the process of culture and language acquisition, so that they become productive members of society.

Qualitative research can help explore the different facets of what it means to be an EBL student facing daily challenges in US schools, while realizing the diversity among EBL students as unique individuals with different cultures, backgrounds and lifestyles. The purpose of this study is to examine the sociolinguistic challenges that a specific group of EBL students (Arab American) face and the extent to which such challenges affect their academic performance in science. These challenges are related to linguistic and cultural interactions, which can lead to conflicts between student and school, thereby interfering with the effectiveness of their education. This study will also examine these students' and their science teacher's perspectives on strategies that can be used to facilitate their language acquisition during science class and help them become active participants in the school and classroom communities.

Research Questions

The following research questions will guide this study:

1. What challenges do Arab American EBL students experience in US schools, particularly in science, and how do their experiences influence their academic achievement?
2. What perceptions do Arab American EBL students have of their educational experiences in the US and how do they perceive their cultural and social identity?
3. To what extent is these students' science teacher aware of the sociolinguistic challenges that EBL students encounter in the science class?
4. What strategies does the teacher use, and/or might use, to remediate his EBL students' sociolinguistic challenges, while facilitating language acquisition and cultural integration in the classroom community?

Significance

The difficulties that many EBL students encounter with language acquisition and social adjustment often impede their success in school. These students are adapting to a new set of language rules different from their native language, while trying to process information related to specific content areas. This duality of learning experienced by EBL students makes their learning process a unique endeavor, particularly in school subjects such as science, resulting in linguistic and social isolation. Because EBL students constitute a significant portion of the US student population, and because this group of students continues to struggle in the American school system, educators need to understand their experiences related to country of origin, language, culture, previous educational experiences, and linguistic challenges they encounter.

In the field of language acquisition, second language acquisition theory, sociocultural theory, and sociolinguistics are three theoretical perspectives that have been explored and developed. Research has made use of these theories to help explain how language acquisition is a social and cultural endeavor that involves interactions of the learner with others such as peers and teachers. However, research on second language acquisition has focused mainly on minority students of Asian and Hispanic backgrounds (see Harklau, 1994; Chang, 1994; Duff, 2001; Patthey-Chavez, 1993; Gomez, 1995 to mention a few). Little research has been conducted using Arab EBL students particularly Yemenis. Even though some of the variables examined with other EBL populations apply to Arab EBL students, Arab EBL students, particularly Yemeni females, possess unique cultural characteristics that impact them socially and linguistically. The Arab society in many Arab countries, including Yemen, is a very traditional, patriarchal culture, with distinct cultural norms and gender-specific roles. As pointed out by Al-Krenawi and Graham (2003), "gender differences in Arab societies remain strong, and the social structure is male dominant" (2003).

In order for Arab EBL students to become integrated into their new environment and way of life, they must be able to become proficient in a new language and culture. Presently little is known about this particular group's struggles as they try to navigate the US school system. As a result, research is needed on the social and linguistic challenges that Arab EBL students have to overcome and the strategies that can be used to enhance their second language acquisition and literacy in the science classroom.

CHAPTER 2 THEORETICAL FRAMEWORK AND REVIEW OF THE LITERATURE

This chapter provides the theoretical framework to be used in this study as well as a review of the literature related to the social and linguistic challenges of EBL students and approaches that have been used to facilitate language acquisition and cultural integration, as it related to the science classroom. Three compatible theoretical frameworks guide this study: second language acquisition theories, sociocultural theory, and sociolinguistic framework. These frameworks will be used as lenses through which the classroom discourse and participant interactions will be interpreted.

Sociolinguistic Challenges of EBL Students

Sociolinguistics attempts to study and understand the relationship between language and society while incorporating these concepts into a social environment that incorporates identity and solidarity (Holmes, 2013). Given the relationship between linguistics and social identity, second-language learners must develop social and linguistic competence. However, EBL students often encounter linguistic, social, and cultural challenges that impede their development of language skills and academic knowledge. When a student is a poor communicator due to limited language skills, s/he might be ignored socially by peers, which in turn decreases his/her opportunities to become a better communicator.

Linguistic challenges often segregate students to their origin or nationality. Language not only determines social communication but defines social roles (Conklin & Lourie, 1983). When adolescents with a home language other than English enter a classroom in which English is the language used, they are often ignored by their native English-speaking peers because of their lack of English proficiency (Gass & Selinker, 2001). This in turn leads to their social and linguistic isolation. They wait for their peers to initiate interactions and try to do things by themselves; they intuit they have no social agenda. Fortunately, the situation improves rapidly

for most second- language learning students as they gain sufficient English proficiency to become social members of a group, resulting in increased participation in group interactions, leading to more situations to use the English language. However, it is important to keep in mind that learning a new language entails more than learning a set of linguistic structures and rules. It also entails learning how to use the linguistic code to communicate and interact appropriately and effectively with others (McCroskey, 2009). As EBL students develop proficiency in a new language, they often struggle with a linguistic type of error known as transfer error or code mixing. Code mixing refers to EBL students' use of words from their native language interspersed in a conversation that is otherwise in a second language (Chamot, 2005).

Language use is structured and every utterance has both social and referential meaning. As previously mentioned, a direct relationship exists between linguistic and social realities (Gumperz, 1967). This is possible because a speaker is entitled to his/her linguistic choices, and the choices s/he makes highly reflect the social context existent at the time of communication. Social challenges among EBL students are mainly provoked by culture and language barriers.

Several studies have examined the cultural and linguistic struggles of EBL students focusing on the linguistic and cultural transition of a particular population. For example, Harklau (1994) conducted an ethnographic study on four Chinese EBL students examining their transition from EBL classrooms to mainstream classrooms in the US. Harklau's participants struggled linguistically in English and social studies content areas because the teacher did not modify and restructure the lesson to incorporate their needs and circumstances. For example, the teacher did not use interactive classroom practices to foster student participation and daily interaction in order promote EBL students' linguistic and cultural competency (Harklau, 1994).

In another study of Asian EBL students, Duff (2001) reported that EBL students' cultural displacement and communication barriers resulted in frustration and academic failure. Duff

recommended the implementation of multiple models of presentations in the classroom to help EBL students make sense of the content, which can be challenging to an educator, since many EBL students enter US schools with poor academic preparation from their home countries. Another study conducted by Del Carmen Salazar (2010) involving 60 high school EBL students of Mexican origin recorded three high school EBL teachers' dehumanizing pedagogical stances in the EBL classroom. The EBL teachers dehumanizing pedagogical stances included: 1) disregarding EBL student's language and cultural identity by promoting English-only approaches, 2) focusing on students memorizing content and skills, and 3) following a status quo that maintains low expectations for diverse learners. This created rigid language boundaries among their EBL students and resulted in limited language development opportunities. Because the teachers did not encourage culture, language, and literacy, the students became isolated and disengaged, and in some cases opted out of school. Salazar recommended that EBL teachers develop humanizing approaches such as promoting cultural knowledge, linguistic resources and the integration of their students' heritage language to increase language learning and academic achievement. The teachers' lack of understanding, sensitivity, and awareness to the needs of their EBL student hindered a successful classroom environment and impeded their academic learning.

In another study by Grami and Alzughaibi (2012) on L1 (first language) transfer among Arab EBL learners investigated the students' common incorrect usage of English words and sounds initiated by interference. Interference in this study referred to as "the influence that the learner's L1 exerts over the acquisition of an L2 (second-language)" (p. 1152). Their findings include many common linguistic errors due to first language transfer such as: 1) transfer of grammatical structure and rules, 2) English spelling with silent letters which does not exist in Arabic writing or reading, 3) transfer of the alphabetic system: Arabic language contains 28 letters, 25 consonants, and 3 vowels, and 4) transfer of L1 phonological knowledge and lexical phrases.

Based on their findings they recommended that teachers of Arab EBL learners should clearly discuss with them the types of errors they make and to constantly ask them to not translate using their mother tongue but instead use their L2 skills. Their study shows that often the mother tongue will heavily influence how an individual speaks and writes in a second language. Second language learners must overcome the habits of their first language to master a second language. However, forgoing habits of the first language are difficult to overcome for many EBL students. Therefore, teachers have to be diligent in their instructional methods to help EBL students acquire a second language. Instructors must recognize their difficulties and provide clear feedback on their language use because "reinforcement encourages the continuation of the response behavior" that facilitates positive learning results (VanPatten & Williams, 2007, p. 19). Without regular and clear feedback EBL students will continue to struggle with their second language capabilities. In another study by Farran, Bingham, and Matthews (2011) involving bilingual Arabic children, and examining the connection between language and reading, found an association between phonological awareness in Arabic and phonological awareness in English, thus supporting reading accuracy in general. However, no associations were found in terms of morphological awareness skills between Arabic and English. In other words, possessing proficient morphological awareness skills in the Arabic language did not aid the participants' morphological awareness skills in the English language, whereas possessing phonological awareness skills did.

Yemeni American EBL Students

Although many EBL students face sociolinguistic challenges, Arab-American EBL students not only struggle with social and linguistic challenges but also cultural challenges derived from their diverse backgrounds and experiences. A new cultural context entails learning how to use the linguistic code to communicate and interact appropriately and effectively with

others. Peregoy and Boyle (1993) defined culture as "the shared beliefs, values, and rule governed patterns of behavior that define a group and require group membership" (p. 8). They proposed that culture is comprised of three influential aspects: "what people know and believe, what people do, and what people make and use" (p. 8). Arab EBL students have a history and culture distinctly different from that of the dominant culture (Ho, 2007). Often a second culture contains a unique set of cultural assumptions and behavioral norms different from one's original culture. This concept of distinct cultural norms is exemplified in the experiences of many Arab-American females since they often face greater emotional distress in their transition to a new sociocultural system, due to their native culture's strict social and linguistic behaviors, particularly in the way they speak, dress, behave, and in their interactions with males. Due to such challenges, Arab EBL students have higher risks of social-emotional and behavioral problems due to different cultural implications and the lack of language competence needed to communicate with others (Luo, 2014). Additional social issues may include segregation, discrimination or isolation based on race, ethnicity, culture, and language which in turn add to the struggles of EBL students and result in poor academic achievement.

The Arab world consists of many countries including Iraq, Lebanon, Yemen, Palestine, Egypt, Kuwait, Saudi Arabia, Jordan, Syria, Tunisia and Qatar. These countries all possess different cultural values, norms and beliefs that dominate their society particularly regarding women rights and freedom. Due to the different mindsets of the various Arabic populations, cultural values implemented in the Arab world vary and strongly influence an individual's behavior. Such restrictions, heavily driven by religion include: 1) forbiding the drinking of alcohol and consumption of pork, 2) prohibiting female interaction with non-relative males, 3) setting guidelines on women's appearance and dress code, 4) requiring mandatory prayers five times a day, and 5) focusing on family reputation, pride, dignity, and honor. The Arab culture is

strongly influenced by Islamic principles, for example women in Saudi Arabia by law must wear head scarves referred to as a hijab and a niqab known as a face vail. However, in Yemen women wear both a hijab and a niqab because it is socially expected in their community not because it is the law. The country of Lebanon, for instance, is more westernized and its people are more liberal.

This study focuses on the Yemeni population which is known to be more conservative based on strict cultural values and religious traditions. A study by Sarroub (2001) on the identity of six Arab Muslim women from Yemen, found that the Yemeni-American women "remained geopolitically, linguistically, religiously, and culturally isolated from American life while maintaining those same ties to their homeland" (p. 391). Sarroub (2001) referred to her participants as "sojourners" to highlight that although these women lived in the United States they did not espouse any aspects of the American life and culture. They behaved as if their life in the US was a temporary passing through. Because of these characteristics of the Yemeni student population, in the classroom Yemeni students face situations that may put into question knowledge previously acquired in their home culture, as they try to understand new experiences and evaluate behaviors and cultural norms in a new culture. Such challenges may be related to how children are disciplined and by whom; how girls interact with boys since it is forbidden among the Arab culture, and how group and individual effort is perceived. Females in such traditional Arabic culture are expected to live by strict norms enforced by their culture and families. For example, if an Arab female has "an interaction or social exchange with a man who is not her relative, such an act will be defined as bringing shame to her family and tribe" (Alkrenawi & Graham, 2003, p. 2). Conservative Arab cultures believe that female interactions with non-relative males might result in premarital sexual relationships, which are prohibited in the Arab society. These expectations particularly with Arabic female students causes them to

suffer from higher levels of stress due to challenges related to family values, social behaviors, cultural adaptation and student expectations (Hicks, 1996). Some may feel that they must reject their home language and culture in order to succeed in the American society. Such feelings may result in a sense of bewilderment, rejection, and loss of ethnic identity (Shaffer, 2008). Educators often do not realize the extent to which EBL students are influenced by their native culture's beliefs, practices, and norms (Gibbons, 2003). EBL students are a product of a culture that may have very different expectations about how students behave in educational settings (Roessingh & Kover, 2002; Aikenhead, 1997). Gilbert and Yerrick (2001) emphasized that preserving their cultural heritage is important to the identity and sense of well-being for adolescents and their families. A study by Kumar, Seay, and Karabenick (2014) on immigrant Arab adolescents in ethnic enclaves, found that Arab Muslim adolescent's cultural identity was mainly formulated based on a common bond related to the Arabic language and their religious affiliations. The authors also found cultural differences within these Arabic enclaves. For example, within a specific different groups possessed their own distinctive cultural community and identity such as being Lebanese, Iraqi or Yemeni. They found that in comparison to Yemeni adolescents, Lebanese adolescents were more inclined to transition into the American society as they lived in more liberal societies in their home country.

Scientific Literacy for Culturally and Linguistically Diverse Students

Scientific literacy has been defined in multiple ways since Paul Hurd used the term in 1958 (Holbrook & Rannikmae, 2007; DeBoer, 2000). Norris and Philips (2003) summed up the various uses of the term to include: 1) knowledge of science concepts, process skills, and values in making responsible everyday decisions, 2) ability to think scientifically and provide scientific knowledge, and 3) understanding the risks and benefits of science and how it relates to cultural literacy. Norris and Philips also distinguished between two aspects of scientific literacy: (1)

fundamental sense (reading and writing within content) and (2) derived sense (being knowledgeable or educated in science). Norris and Phillips (2003) stress that even though scientific literacy has focused on areas related to derived sense (being knowledgeable of science); the areas related to fundamental sense (reading and writing) are just as crucial to becoming scientific literate. To make their point, they use the example that an individual can possess knowledge of a subject from the media or community, while being unable to read or write. Often by the time EBL students enter US schools they possess some knowledge of science (derived sense). However, they have little fundamental sense due to their lack of reading and writing skills.

EBL students bring to the science classroom diverse cultural and linguistic needs that must be understood if they are to be instructed properly and become successful in science. One of the main needs EBL students have relates to academic cognition and comprehension in science due to prerequisite knowledge required to deal with unfamiliar science concepts (Lee & Fradd, 1998). EBL students bring different cognitive levels to the classroom due to their varied cultures, languages, and ways of learning, which increase their sociolinguistic challenges. They might have learned English at different ages, and although many might have sufficient oral language skills, they often lack proficiency in reading and writing. EBL students need support in making meaning from words and contextualizing terms because science requires a certain base knowledge of other subject matters such as reading and mathematics (Brownlie, Feniak, & McCathy, 2004). For example, students who are proficient in mathematics are able to better understand and analyze the quantitative aspects of science. However, even when EBL students understand mathematics, they still have difficulties in science if they struggle in reading and writing English because science literacy requires precision, critical thinking skills, and logical reasoning (Warren, Ballenger, Ogonowski, Rosebery, & Hudicourt-Barnes, 2001).

A scientifically literate individual possesses in-depth understanding of scientific knowledge, the process used to develop the knowledge, and the nature of science (Holbrook & Rannikmae, 2007). More importantly, scientific literate implies one's ability to use this knowledge to make informed decisions in regards to scientifically and technologically issues encountered on a daily basis. As a result, science education must emphasize socio-scientific decision making and problem-solving as crucial areas for enhancing scientific literacy, rather than just understanding content knowledge. Moje, Collazo, Carillo, and Marx (2001), argue that the meaning of scientific literacy is changing due to the growing culturally and linguistically diverse population of both the students and teachers, and pedagogy that encourages science inquiry. Although there is a debate among science educators and scientists as to what the term scientifically literate actually means, from the educational standpoint, the term implies a general knowledge and appreciation of the scientific enterprise; an ability to critically read and understand basic scientific information found in newspaper and magazines; and the ability to question what one hears on television or reads on the Internet. According to Roth (2003), basic scientific literacy is an essential element of an individual's role as a citizen in a democratic society, whereas Gee (1999) argues that Discourse (big-D) and identity are related to "socio-scientific discourse" because developing scientific literacy comes from one's own perspective and identity.

According to Lee (1997), scientific literacy and learning depend on a student's language and culture. Barton and Yang (2000) pointed out that science education reforms presume all children learn science regardless of their gender, culture, age, or ethnic background not just those who are privileged. These reforms do not take into consideration the diverse experiences and backgrounds of students and fail to acknowledge that not all children have equal educational opportunities. Similarly, Eisenhart, Finkel, and Marion (1996) argued that science education

reforms do not acknowledge the fact that traditionally the scientific enterprise has limited the participation of women, girls and minorities. They pointed out that even though these reforms have a broad vision of scientific literacy, they disagree with the premise that teaching key concepts and inquiry results in scientifically literate individuals. They suggest science education focus on attaining scientific literacy by incorporating students' diverse backgrounds and promoting social responsibility.

The National Research Council (NRC) states that to ensure all students, including English Language Learners, have opportunities to learn and excel in science, curricula for EBL students should be based on science content and processes outlined in the Next Generation Science Standards (NGSS) and involve science investigations that promote inquiry (NRC, 2012). In order to develop proficiency in science, student experiences must be taken into consideration to support academic learning (NRC, 2012). As a result, science instruction should recognize and distinguish the linguistic and cultural experiences of English Language Learners and understand the "funds of knowledge" **(**Moll & Amanti, 2001) they bring to the classroom from their homes, community and society. Science instruction must integrate these experiences with science knowledge, and offer adequate educational resources to support science learning.

Educators must attempt to reach all students, regardless of their individual backgrounds and situation. According to McCroskey (2009), the perception of caring is critical to students' feelings of belonging in the classroom. EBL students need to feel that their teachers care. Students know a teacher cares when s/he takes initiative to comprehend the students' experiences and backgrounds in qualitative ways (Mitchell & Myles, 2004). As a result, educators must teach EBL students within a caring and loving environment in order to increase their sense of belonging and decrease their sociolinguistic challenges.

EBL students may enter school with different knowledge bases and because most teachers do not speak the same language as their EBL students, they must rely on English for instruction. This in turn limits EBL students' access to what is being taught. However, regardless of the language barriers that might exist, science teachers can motivate students and build on their curiosity by engaging them in science investigations related to meaningful issues. These types of activities help students develop critical thinking skills and develop their awareness of the complex interactions among science, technology, society and the environment (Solomon & Aikenhead, 1994). Such educative process encourages multiple views about an issue; allows students to value their linguistic and cultural backgrounds; and helps develop their identities as science learners (Lee, 2010). According to Fradd and Lee (1999), instructional strategies must be implemented to foster students' literacy skills through linguistic scaffolding in order to enhance students' understanding of complex science concepts. In addition, scientific literacy is developed when students are engaged in activities that explore the what, how and why of science.

Second Language Learning Theories

The theories on second language acquisition have been instrumental in helping to explain the cognitive processes of second language learning and the skills necessary to assist students who are learning in a non-native language. Two of the most influential aspects of second language acquisition are Stephen Krashen's language theories (1987) and Sociocultural Theory (1978). These two theories have helped educators distinguish between conversational versus academic language and realize the cognitive challenges EBL students encounter when learning academic material. Cummins (1992) made the important distinction between "conversational" and "academic" language. Conversational language refers to language used for everyday interaction, whereas, academic language refers to the language of school, politics, science, and

business. Studies on English language acquisition typically deal with conversational language, not academic language (Krashen, 1996). Krashen's (1987) theory of second language acquisition is important to science learning because his ideas promote academic English language development needed to comprehend complex science inquiries, not conversational language.

Approaches to Facilitating Second Language Acquisition and Cultural Integration

Human beings constantly have to make meaning of their surroundings. When individuals are placed in a new environment or condition, they immediately try to comprehend and sort out unfamiliar situations. This is true for all EBL students placed in all English classrooms. They immediately look for clues to "crack the code" of the classroom (Kayi-Aydar, 2013). Signs, visuals, illustrations, or simply a friendly face, all assist students with understanding and creating meaning of their new environment (Fillmore, 1982). This necessity to create meaning is at the heart of language acquisition.

Science classrooms are particularly frustrating and overwhelming for English Language Learners due to the complex vocabulary of science. Indeed, science learning is difficult even for students who are native English speakers let alone English Language Learners, because it requires constructing meaning and building relationships among ideas. However, when students are given opportunities to create and convey meaning through relevant social interactions and activities among their peers, higher levels of language are acquired (Stoddart, 2002).

First Language Acquisition (FLA) and Second Language Acquisition (SLA) differ in terms of the abilities of one's cognitive development. In FLA, the child is submerged in the language and the brain processes many inputs and outputs and language becomes the means to create meaning (Gass & Selinker, 2001). The knowledge base in first language acquisition is like a blank slate that is filled up through learning a first language (L1). SLA, on the other hand,

comes into contact with an already "filled slate" in the sense that the person has already created meaning through the first language (Gass & Selinker, 2001). Therefore, the individual relates any new knowledge back to the L1, which impedes cognition of the L2 (Gass & Selinker, 2001). This is the reason why emergent bilingual learners (EBL), English as a second language (ESL), limited English proficiency (LEP) or English language learners (ELL) students constantly encounter cognitive challenges when trying to process and communicate in the L2.

A number of theories have been proposed to address EBL students' second language acquisition including: The Creative Construction Theory (Dulay & Burt, 1973), Communicative Language Teaching (Savignon, 1999), Krashen's Theory of Second Language Acquisition (SLA) (Krashen & Terrell, 1983) and the Cognitive Approach (Dweck & Leggett, 1988). However, EBL education emphasizes the work of Krashen's (1987) Theory of Second Language Acquisition (SLA) in combination with the Vygotsky's Sociocultural Theory (SCT) (Shaffer, 2008). Krashen's theories for language acquisition allege that in order to effectively acquire a language, whether a first or second, the individual must not solely engage in memorization drills or rely on the conscious act of learning. Instead of routine drills, individuals learn the language by actively engaging in the environment through interaction with others within the culture (Krashen, 2003).

Krashen's theory of second language acquisition. Stephen Krashen (1987) posited that language acquisition does not require a general routine of conscious learning and the memorization of grammatical rules and tedious drills (as cited in Schütz, 2007). Additionally, Krashen argued that "acquisition requires meaningful interaction in the target language— natural communication— in which speakers are concerned not with the form of their utterances but with the messages they are conveying and understanding" (as cited in Schütz, 2007, p. 19).

Krashen argued that in order for students to acquire and master the English language they need to engage in ordinary means of communication such as interactive activities that require EBL students to adopt a hands-on approach to mastering the English language. Krashen concluded that learning and acquisition can indeed be separate entities when it comes to SLA. Students who engage with the material are acquiring new skills that will assist them in language acquisition. Krashen assumed that when teachers teach a lesson, and students are required to learn the rules and mechanics required to perform the task, they are learning, not acquiring skills.

Krashen also argued that speaking English through intense interaction with others aids in developing proficiency in a second language and reduces linguistic barriers. Krashen (2004) claimed that social interactions help to stimulate learning and in acquiring a second language. As a result, instructional approaches such as those under constructivism are very effective in second language acquisition because of the high level of interaction among students. One of the advantages of social interaction on language acquisition is that students acquire a broader vocabulary base, which allows them to communicate more effectively with peers and teachers. Therefore, a direct teaching instructional method such as lecturing is not effective in second language acquisition because of the low level of student interaction. Krashen (2003) insisted that "It is not clear that direct teaching results in true acquisition… it results in learning, not acquisition, a fragile, kind of knowledge that is unavailable unless stringent conditions are met, and that fades fairly quickly with time" (p. 28). Krashen's second language theories try to explain how EBL learners organize their knowledge of a second language and how additional learning affects EBL students' knowledge base. Krashen's view that students must actively interact with their environment is a point that is heavily emphasized in the SocioCultural Theory (SCT). SCT proponents argue that students learn through their environment and social interactions.

Sociocultural Theory and language learning. Second language acquisition is improved when learners can identify with their peers and surroundings, especially when language use is implemented within concrete activities (Wertsch, 1998). SLA has devoted attention to social and interactional factors as variables that foster language acquisition. A language develops in social and cultural contexts (Labov, 2010). Learning a second language for academic purposes therefore involves the comprehension of the sociocultural semantic field surrounding that language. Sociocultural theory resides in the premise that "the individual emerges from social interaction" (Lantolf & Thorne, 2007, p. 218). Students become the products of their environment, and an effective learning environment can aid students in SLA. Sociocultural theory postulates that students' early language learning is enhanced from constructing meaning in a collaborative setting with other members of a given culture (Mitchell & Myles, 2004). As a result, EBL students must actively engage with native speakers to enhance their Second Language Acquisition skills. Sociocultural Theory especially revolves around the concept that SLA is not a linear process, therefore to effectively help EBL students, teachers need to use a variety of methods, and avoid employing a one size fits all approach. VanPatten and Lee (1990) claim that Second Language Acquisition is a difficult process, but proper instruction and facilitation can ease the hardships that EBL students face.

From the social interaction or cultural perspective, EBL students learn a second language through interactions with others. Therefore, language abilities come from a social aspect of the individual's environment and cultural surroundings. Students learn language through constructing meaning in a collaborative setting promoting intercultural interactions (Mitchell & Myles, 2004). Students learn not only through individual cognition, but through their environment as well. The environment plays a pivotal role in developing proficiency in a second

language, and school and home interactions both contribute to EBL students' learning and acquisition of a second language.

In this respect, sociocultural theory is indicative of Lev Vygotsky's work, which places importance on the individual's social environment (Shaffer, 2008). Learning occurs through an individual's interactions with the outside world. Vygotsky asserted that most human interactions take place in a cultural atmosphere, where humans interact with one another (Shaffer, 2008). These social interactions are predicated on language and other symbol systems that create meaning for the individual. Shaffer (2008) claimed that individuals are interdependent on social processes that create meaning which leads to the construction of knowledge. Both Shaffer and Zimmerman (2003) agree that in terms of acquisition of language, close relationships within one's environment, including social and cultural contexts, allow individuals to develop cognitive and linguistic proficiency. Learning is more than just cognition; it is the combination of individual activity and community involvement. Educators need to realize that learning is not an individual event that happens in isolation and only through an individual's interactions with the material. Students become more apt to construct knowledge through peer group work, teacher evaluations and assessments, and participation from their parents and guardians in the school environment.

The authoritarian role utilized by teachers in many classrooms rejects the idea that learning is a group activity that involves active participation of students with their peers. Group interactions are a sociocultural endeavor that aids in the learning process (Ho, 2007). Because learning is a social process that stems from social interactions, the benefits of socialization must be addressed and implemented in the classroom especially when targeting EBL students. Through social interaction, students will be able to acquire knowledge by constructing meaningful learning experiences present in a given environmental setting. Teaching children

through lecture does not engage them nor does it allow them to collaborate with peers or the instructor. This is particularly important in science where students are expected to generate questions, design investigations, and analyze scientific text (Lee, 2010).

Constructivist approach to language learning. As previously stated, SLA and SCT, language are imbued with social significance; and since acquiring knowledge and scientific literacy is based on interpersonal experiences, both principles are crucial components of a learning theory known as constructivism. The nature of the linguistic environment, in terms of how comprehensible new language is made for the learner, greatly influences the rate of the learner's language acquisition. Learning through social interaction engenders constructive talk around curriculum and problem solving activities, which has been shown to improve language and academic development of EBL students by developing their social skills and understanding of their individual identities (Shaffer, 2008). Through constructivist-learning, students (1) bring a wealth of knowledge to the learning environment, (2) use their personal interpretation to develop meaning to gain knowledge, and (3) assess their own learning. This allows EBL students to construct knowledge and meaning of scientific ideas through social interactions where they are actively engaged in their learning acquisition (Fosnot, 1996; Staver, 1998). This idea ties back to the sociocultural theory; where the creation of interpersonal interaction is based on social and cultural norms that constructs individual meaning and perspectives.

Constructivism is a theory emphasizing that knowledge does not exist outside the minds of thinking individuals and knowledge is based on meanings and interactions among people (Ritchie, Tobin, & Hook, 1998; Staver, 1998). Von Glaserfled (1993) defines constructivism as the notion that humans construct or build meaning into their ideas and experiences as a result of an effort to understand or to make sense of them. In addition, people do not acquire knowledge about an independent reality; rather they construct knowledge to fit what they experience.

Social constructivism, which emerged from the work of Vygotsky, states that knowledge is created through interpersonal processes by individuals, stressing the importance of language and culture (Atwater, 1996; Staver, 1998). This concept views knowledge as fundamentally cultural, suggesting that meaning is constructed through social interactions and cultural implications. Vygotsky (1978) argued that the community, teachers, parents and the children's surrounding played a critical role in how they acquire knowledge and see the world based on their conception. Through these social interactions multicultural students will become aware of others' thoughts, and what others think about their thoughts and actions (Atwater, 1996).

The direction of intellectual development goes from social to individual (Vygotsky, 1986). Humans use cultural tools, such as language, literacy, mathematics, and computers, to guide their interactions with others and their surroundings. Students develop skills in higher mental processes through immediate social interactions. Adult support, guidance and collaboration with more skilled peers are two major ways of social interaction, which mediate the "zone of proximal development." Vygotsky (1979) defined the term as "the distance between the actual development level as determined by individual problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (p. 86). Therefore, from a Vygotskyian perspective, creating social contexts to master cultural tools is of high importance in the schooling atmosphere. Vygotsky's learning theory provides educators with a framework that should be used in the design of rich social contexts to help EBL students develop and practice their second-language skills.

Through constructivist instructional methods, EBL students can construct mental representations by engaging in learning that promotes active cognitive processing (Fosnot, 1996). In such environments EBL students actively construct knowledge by integrating new

information with previously learned information (Soloman, 1994). In the science classroom constructivism evident when learners explore, construct and generate new ideas as they engage in learning activities such as developing hypothesis and models (Fosnet, 1996). In such environment the teacher serves as a guide, helping students discover and reflect on complex content using inquiry, investigation, research and analysis. Through these processes students are encouraged to develop the ability to think for themselves and to think critically by constructing their own meanings (Wheatley, 1991).

Constructivist learning is an instructional method because it relies on the argument that the learning process should be student-centered and students should create their own meanings (Brooks & Brooks, 1999). Constructivist theory sees learning not as a linear process, but as "a complex process the linear precepts of measurement and accountability. What students 'know' consist of internally constructed understandings" (Brooks & Brooks, 1999, p. viii). Learning occurs when students internalize and relate what they are learning to previously acquired knowledge.

In the constructivist classroom, teachers assess their students' abilities and structure learning around their needs. Learning opportunities are built on the student's existing knowledge base, so that new meaning can be created. A constructivist learning environment encourages students to actively participate in the learning process, from which EBL students often shy away. In the constructivist learning framework, learning becomes more student centered and interactive, as students are required to participate with their peers, as well as the teacher.

Brooks and Brooks (1999) argued that a constructivist instructional method is better in tune with the student's cognitive learning needs. Students learn through interactions with materials and their environments; therefore, students need to be active participants in their learning process. Constructivist learning is not solely geared towards the native English speaking

student. Constructivist teaching allows all students to successfully engage in the learning process and develop understanding of the material provided. EBL students benefit from constructivist classrooms because they have access to engagement with peers, thereby facilitating linguistic proficiency and cultural integration. Peer teaching in an important aspect of such rich learning environments, even though it is often undervalued in many schools systems (Brooks & Brooks, 1999). Through peer interaction, EBL students learn proper pronunciation of English words, and witness first hand syntactical and linguistic patterns of the English language, which enhances their sociolinguistic competence.

Summary of the Literature

In this literature review, I argue that it is vitally important to understand the challenges faced by EBL students in order to help raise their achievement. Teachers who are not familiar with the cognitive process of EBL students, or who have little awareness of their sociolinguistic challenges, need training to enhance their instructional methods to meet the needs of their EBL students. It is important for educators of EBL students to be aware of the current theories of second language acquisition, as well as the social and cultural implications of learning science while learning a new language.

Research suggests that outside forces, including a student's native language and culture, influence a student's learning ability and interaction with the target language. As a result, it is necessary when thinking about language learning, to incorporate the sociocultural, second language acquisition and sociolinguistic approaches. Sociocultural theory claims that "children's early language learning arises from processes of meaning making in a collaborative activity with other members of a given culture" (Mitchell & Myles, 2004, p. 200). Therefore, language capabilities develop from social components of the individual's given culture. In this respect,

researchers do not study language as a separate isolated activity but rather as a social and cultural phenomenon utilized in daily human interactions.

In terms of second language acquisition, the application of the sociocultural approach has been fairly recent. In fact sociocultural theory was not originally intended as a theory to explain second language acquisition (Swain, Kinnear, & Steinman, 2010). However, as scholars in the field of second language acquisition recognized the need to take a more heuristic approach to understanding students' needs, they began applying sociocultural theory to second language acquisition (Lantolf & Thorn, 2007; Johnson, 2004). Swain, Kinnear, and Steinman (2010) argued that the application of sociocultural theory to the field of second language acquisition "makes for a richer and deeper understanding of many phenomena, particularly second language learning and teaching" (p. xiv).

Although second language acquisition theory, sociocultural theory, and sociolinguistics all have their own particular nuances, they are deeply interconnected in terms of pedagogical inferences for language teaching and learning. All three theoretical insights focus on language and literacy development components driven by social interactions among individuals to conceptualize learning and teaching processes. However, the sociocultural theory claims that cognitive development and knowledge is personally constructed through social interaction, cultural variation, and human experience specifically integrating Vygotsky's zone of proximal development as a process of human learning; whereas, Krashen's second language acquisition theory asserts that language is only acquired if individuals participate in meaningful communicative exercises through a variety of contexts and are effectively instructed to use academic language rather than conversational language. On the other hand, the sociolinguistics approach strictly focuses on spoken language, sentence structure, phonemic awareness and semantics disregarding the individuals' culture, socialization contexts, construction of meaning

and personal experiences. Even though, the sociolinguistic framework undermines many detrimental variables to language learning, it contributes the concept of code-mixing or sometimes referred to as transfer error as previously described, which is neglected in both the sociocultural and second language acquisition approach. Therefore, because EBL students' social and linguistic factors are highly influenced by proficiency in second language acquisition, sociolinguistics, and integration of the sociocultural theory, all three theories are used as the lens to guide this study. Since EBL students bring to the classroom the particulars of their native language that influence how they read, write, comprehend and understand in the English language; educators and teachers need to understand the various aspects of these theories as they address the needs of their diverse students.

Theories of literacy and language acquisition (Gee, 1999; Krashen, 1982) suggest that learning is influenced by students' engagement in rich environments that include opportunities for authentic communication. Research has shown that significant achievement in science literacy results when bilingual/bicultural students participate in rich scientific practices (Moje, Collazo, Carillo, & Marx, 2001; Roseberry, Warren, & Conant, 1992). However, this study focuses on students from a Yemeni Arab population with traditional Arab cultural norms that include inflexible gender roles and conservative cultural values. Females in such traditional Arabic cultures are expected to live by strict norms enforced by their culture and families. Such restrictions include prohibiting female interactions with non-relative male peers. Yet, second language acquisition theory and sociocultural learning theory insist that students learn from their interactions with adults, peers, and available cognitive tools (Zimmerman & Schunk, 2003). As a result, these approaches might be difficult to implement in coed classrooms, since Arabic female EBL students come from a culture specifically restricting them from interacting with male peers.

Definition of Terms

A variety of terms will be used throughout this study including:

Limited English Proficiency (*LEP).* Language minority students who are in the process of acquiring English language skills and knowledge" (Department of Education, n.d., para. 1).

Emergent Bilingual, is a recent term used to describe ESL (English as a Second Language), ELL (English Language Learners), and LEP (Limited English Proficiency) students. These students are considered bilingual because they can function in their home language as well as their new language (García, Kleifgen, & Falchi, 2008).

English Language Learners (ELL). Children whose parents speak at home a language other than English (Linan-Thompson & Vaughn, 2007).

English as a Second Language Learner (ESL). Individuals whose native language is not English. English is the second language that the individual has learned (Linan-Thompson & Vaughn, 2007).

Second Language Acquisition (SLA). Refers to the process of learning a second language after establishing the first language (Krashen, 1983).

Sociocultural Theory (SCT). This theory focuses on the effects of human activities and social interactions within a cultural context on an individual's development (Vygotsky, 1978).

Constructivism. Theory that assumes knowledge cannot exist outside the minds of thinking persons and knowledge is based on meanings and interactions among individuals (Von Glaserfled, 2001).

Sociolinguistics. Is the study of the various factors such as culture, beliefs, norms, standards, and settings that affect language use and vice versa (Labov, 1960).

CHAPTER 3 METHODOLOGY

Since the focus of this research was to take a holistic approach in order to understand EBL students and their sociolinguistic challenges, a qualitative interpretive methodology approach was used. Qualitative research "understands human behavior by focusing on the meanings that events have for the people involved" (Ary, Jacobs, Razavieh, & Sorensen, 2009, p. 23), whereas interpretive research "focuses on analytically disclosing those meaning-making practices, while showing how those practices configure to generate observable outcomes"(Yanow, Dvora, Schwartz-Shea, & Peregrine, 2012, p. 14). Therefore, qualitative interpretive studies seek to understand and examine a phenomenon from the participants' perspective. The design of qualitative research evolved during the course of the study as an inductive approach was employed with a small sample of participants; with the researcher as the primary data collection tool.

In educational research, there has been a growing shift from positivistic studies to more human interactive studies (Freebody, 2003). According to Freebody (2003), this trend in exploring social interactions was borrowed from qualitative anthropological models that existed as early as the colonial period in America. The study of human interactions allowed researchers to inquire into phenomena related to human behavior. According to Creswell (2008), qualitative research attempts to describe and interpret the "behavior, language, and interactions" of a cultural group to make sense of them. Therefore, explanation, interpretation, and analysis of cultural groups are critical components of interpretive research. Such research can aid in educators' attainment of knowledge, the improvement of practice, and the employment of informed policy debates affecting students, particularly those from underrepresented groups.

The interpretive approach was the preferred qualitative design method when examining a phenomenon related to the social and cultural life of a group as it involves the direct observation

of the events being studied and in-depth interviews with those engaged in the events (Lecompte & Schensul, 2010). According to Orlikowski and Baroudi (1991), interpretive studies "assume that people create and associate their own subjective and intersubjective meanings as they interact with the world around them" (p. 13). Therefore, interpretive researchers try to understand the phenomena by retrieving the meanings participants assign to them. Qualitative interpretive research allows the researcher to examine occurrences and individuals in their natural state without any interference of a treatment. This study strived to understand the atmosphere that surrounded Yemeni Arab EBL students within their social and cultural context. This qualitative research design allowed the collection of "rich descriptive data about beliefs, contexts and activities of participants in educational settings" (LeCompte & Schensul 2010, p. 16).

Setting and Participants

Setting. This study took place at a high school located in a large Middle Eastern Community in the Midwest. Approximately 1/3 of the population claims Arabic speaking ancestry, which since the 1990s has experienced a 30 percent increase in the number of foreign born Arabic-speakers. According to the US Census Bureau, the school is located in a county with the highest proportion of Arabic ancestry in the United States, resulting in a large number of Arabic speaking bilingual students in this community's schools. The school served around 1500 students in grades 9-12. The ethnic makeup of the student population consisted of 55% Middle Eastern (Arab), 35% White (American), 6% African American, and 4% Other. Approximately 35 percent of the school population was comprised of EBL students from Arabic speaking countries, with varying degrees of English proficiency.

In 2012, this high school was listed as a state "priority" school, meaning it ranked in the lowest 10 percent of state's schools due to a significant achievement gap on the state

achievement tests between the top and bottom 30 percent of students in the school. In response to these state test results, the school district announced a focus on literacy and other essential academic skills. In addition, approximately 75 percent of the students were eligible for free or reduced price lunch. This school was chosen for this study mainly due to its diverse linguistic and cultural makeup of the student population. The district boundary lines separate the various Arabic communities and this high school has the largest Yemeni student population. As families migrated to the city in which the school is located, they chose to live within their own Arabic cultural group and the school reflects the makeup of the community.

At the school in this study, all EBL students, must go through an entrance and exit protocol of the bilingual program which includes: 1) potential eligibility, 2) W-APT Screener, 3) English language proficiency level (up 6 levels), 4) entrance criteria, and 5) exit criteria. The students' eligibility to enter the bilingual program is based on the criteria that a language other than English is the child's primary language (native or first language) and home language (the language most often used in the home or the language primarily spoken by those in the home). The students then take the WIDA-ACCESS Placement Test, an English Language Proficiency (ELP) screener given to incoming students who may be designated as emergent bilinguals. ACCESS for EBLs is a secure annual ELP assessment given to K-12 students who have been identified as English Learners. ACCESS stands for Assessing Comprehension and Communication in English State-to-State for English Learners. This screening process assists educators with placement decisions such as identification and placement of EBL students. The W-APT test items address WIDA's 5 ELP standards which include: 1) social and instructional language, 2) language of language arts, 3) language of mathematics, 4) language of science, and 5) language of social studies. There are six English Language Proficiency Levels in which EBL students fall under: 1) entering, 2) emerging, 3) developing, 4) expanding, 5) bridging, and 6)

reaching. In order for an EBL student to exit the bilingual program, the following must be met: 1) must score 4.5 or higher in all four domains (listening, speaking, reading, and writing), and 2) obtain a score of 5.0 or higher on WIDA composite/overall score. In addition, the school monitored those students after their exiting process. For instance, if a student's daily performance across content areas was not commensurate with test results, the districts' EBL team may consider maintaining the LEP status or reclassifying. After exiting the bilingual program, all EBL students must be monitored for two years to ensure they meet state content standards as measured by state content assessments.

The school had implemented several accommodations to assist its EBL students' transition into their educational setting. For instance, a bilingual program was employed and a specific hallway in the school was assigned to EBL students, where all their lockers and classes took place. Due to the school's awareness of its EBL students' cultural background, particularly in terms of separation of the sexes during physical activity, the school offered gender separated gym classes. The school had even attempted to employ an all-girls after school dance to increase participation of Yemeni female students. However their parents still did not allow them to attend. The school also provided an in-school mass prayer program on Fridays led by a Muslim faculty member in an effort to reduce the amount of excused absences during Friday afternoon prayers, because many students left school to attend religious services at their mosque. During the holy month of Ramadan, the class and sports schedules were also modified to better accommodate the needs of the Muslim students.

To build a safer learning environment and reinforce positive inclusiveness, the school had employed a bullying prevention program involving parents and students in efforts to address bullying and violence. Additional accommodations included letters to parents and automated robo-calls done in the Arabic language and Arabic interpreters hired to translate between

teachers and parents during parent-teacher conferences. The school also provided transportation for parents to attend parent-teacher conferences because they were aware that most parents of their bilingual Yemeni students, particularly the mothers, did not drive, which hindered their participation in such school events.

The biology class in this study had 28 students, 15 of whom were EBL students (9 males and 6 females, all from Arabic speaking countries). The school had attempted to place bilingual students in classes based on their level of English proficiency. However, this approach had not been successful and many of the classes, such as the one in which the study took place contained mainstream and bilingual students, even though it was referred to "as the bilingual biology class".

Participants. The participants in this qualitative interpretive study were four Arab EBL students from Yemen and their science teacher. The four student participants were in 9th grade biology class. At the time of this study the four students, two females and two males, were at different stages of their educational experience in the US. Two of the participants (one female and one male) had been in the US for six months or less, whereas the other two participants (one female and one male) had been in the US for 18-24 months. The goal in selecting students at different points of their residence in the US was to document any differences in the struggles and success of students at different stages of their second language acquisition and cultural integration and determine the extent to which their experiences were influenced by gender.

The selection of the study's participants employed a criterion method based on the requirement that all EBL students must be Arab immigrants between the ages of 13-18 years old, in an American high school program. The researcher used purposeful sampling to select 2 male and 2 female Arabic Yemeni EBL students from those who volunteered to participate in the study. The EBL population at the study's high school consisted of primarily Yemeni students,

which is why that particular population became the target of this study. Unlike random sampling, purposeful sampling is "a strategy in which particular settings, persons, or events are selected deliberately in order to provide important information that can't be gotten as well from other choices" (Maxwell, 1996, p. 70). Pseudonyms for all the participants were used to ensure their anonymity and confidentiality.

Personal Disclosure

I am no stranger to the adversity faced by students who speak English as a second language. I was compelled to immigrate to the United States from Iraq at the tender age of 12 in an attempt to seek refuge from the Gulf War. My family and I came to the United States with hopes of escaping the pain and suffering we experienced in Iraq. I clearly recall fleeing our home under threat, witnessing fighting and destruction, seeing violent acts, and leaving our friends and possessions behind. Moreover, the struggle of being transported in crowded vehicles, spending months in transit camps, and eventually finding temporary respite in a country at peace while the authorities decide whether the family would be granted permission to remain legally and indefinitely, was a traumatic endeavor.

The transition into adolescence involves physiological and emotional changes and is fraught with difficulties, such as peer pressure and wanting to fit in. As an adolescent in a new school system I experienced additional challenges as I struggled with a new language and culture, resulting in isolation. My lack of knowledge of the English language prevented me from forming relationships with my peers, which in turn heavily impacted my self-esteem and confidence. I felt isolated during my first year and even when some students attempted to communicate with me I could not understand the speed of their English. I was unwilling to participate in any school or classroom activities for fear of humiliation and ridicule; which had happened several times. My classmates never involved me in group activities since they knew I

could not contribute much with a language barrier. I felt isolated from my peers, became depressed, and begged my parents for homeschooling. The language barrier, as well as the cultural shock, resulted in anxiety and stress which influenced the way I dealt with information on a cognitive and emotional level.

In addition to the communication barriers I had to face, I also had difficulties understanding and adapting to the American culture. Walking into school the first day I was already shocked to see boys and girls mixed in the same school and classrooms, as this was not the way in my former school. Then I had to follow the schedule they gave me, searching for classroom numbers that I could not understand, nor could I understand the meaning of the bell to indicate the beginning and ending of class. I still recall the day when I sat in the bathroom crying during lunch because I was teased by the other kids for not knowing what a hot dog was. I repeatedly missed school due to fear of being taunted and having my foreign accent mocked. The culture I was experiencing was so distinctively different from my own that I had difficulty adjusting. This created more feelings of isolation and loneliness, which affected my attention to learning.

These challenges that I experienced as an EBL student, inspired interest in focusing my dissertation research on the social and linguistic challenges that EBL student's experience. Currently 40% of the students in the classes I teach are EBL and I cannot help but notice their withdrawal, anxiety, shyness, and fears as they are attempting to communicate and socialize. Many of these students perform poorly in academic subjects and I can understand their struggles having lived through similar experiences. It is my hope that this study will help me and other educators better address the needs of these students.

In addition to my experiences as an EBL, Arab-American student, I am also a teacher at the high school in this study. As a result, I am familiar with the school's atmosphere, the cultural

background of the various Arabic student groups, and of the struggles they face as they try to learn a second language and adapt to a new culture. However, even though my connection to the school facilitated access to the study's setting and participants, and my command of the Arabic language and previous experiences as an EBL student facilitated communication and rapport with the student participants, I did not, in any way, use my status at the school to coerce students or their teacher to participate in the study. The science teacher in this study was a colleague of mine who was interested in the research topic, whereas the student participants were recruited through conventional procedures as mandated by WSU's Institutional Review Board (IRB). Furthermore, although my experiences as a former EBL Arabic student informed my research, I did not impose such experiences when interpreting the study's data.

Participant recruitment. As previously indicated, the participating science teacher volunteered for the study due to the large number of EBL students in his classes and his interest in the research questions that framed the study. All four participating students were in one of his classes. The science teacher taught both mainstream and EBL students in the same classroom.

I recruited the students by making a presentation regarding the study at the end of one of their science classes. I informed the students about the goals of the study, types of data that would be collected, and the time commitment related to each type of data collection approaches in which they would participate, if interested. Students were told their participation was voluntary and that they could withdraw from the study at any time without any consequences. In addition, they were informed that information in reports would be provided in aggregate form and that no real names would be used with any information, and, that instead of names, codes would be used in order to connect individual pieces of data to individual participants if needed.

A waiver of parental consent was granted by WSU's IRB and instead of parental consent, an informational letter was sent home with the students interested in participating in the study.

The informational letter described the study and contained a tear off piece at the bottom, which parents could use to notify the researcher if they did not want their child to participate in the study. After waiting for the parents' response for a period of two weeks, the researcher then obtained a written assent from each student participant at the school. Students whose parents returned the sign off sheet were excluded from the study.

Data Collection Procedures

All four students and their science teacher were observed in their science class for the duration of 15 class periods (60 minutes each) to gain in-depth knowledge of the social and linguistic challenges they faced during science instruction, as well as strategies that the teacher used to mitigate these challenges. Some of the classroom observations took place during summer school and while the Muslim students observed religious practices related to the month of Ramadan. After classroom observations were completed, the students and teacher were individually interviewed. The interviews lasted about 60 minutes each.

The qualitative data collection included field notes from classroom observations during science class and audiotaping of student interactions during group work. Additional data included individual interviews with the students and teacher, and classroom artifacts such as student work. The observations shed light on the students' linguistic and social challenges, while the interviews highlighted their perceptions about their EBL experiences and accommodations that in their view might help their transition in becoming scientifically literate.

Classroom observations. After each participant agreed to take part in the study and signed the consent form, dates for the classroom observations were arranged with the science teacher. Students were observed in their science classroom where their social interactions were audiotaped during group work. Field notes were also written of salient events in the classroom related to challenges these students faced in terms of their speaking skills and interaction with

others, as they participated in the science classroom. Specifically, observations focused on the student's social and linguistic encounters within their science class. The observations were also used to identify levels of support the teacher and school provided to meet their needs.

Second language acquisition and sociocultural theory imply that a rich learning environment allows the teacher and the EBL students to find learning more beneficial and helpful through social interactions with peers and hands-on activities. Since speech behavior and social behavior are in a constant realm of interaction, and often determine and influence each other, observing the different factors simultaneously did not affect the data collection process. Because the second language acquisition theory suggests that language learning is acquired at a higher level when implementing a variety of effective instructional methods, classroom observations also included videotaping the teacher to examine the type of strategies he used to encourage interactions among linguistically and culturally diverse groups of students and opportunities provided to EBL students to express their points of view during class.

Interviews. Students were interviewed individually using open-ended questions (see Appendix for sample questions). The interviews were used to obtain detailed background information on each student, (e.g., family status, experiences in home country, etc.), and to explore more in-depth issues identified during the observations. In addition, all four student participants were asked the same basic questions regarding their social, cultural and language barriers they had faced and possible strategies that the school and/or teacher could use to meet their needs.

The teacher was also interviewed at the completion of all classroom observations. The purpose of the teacher interview was to assess the teacher's level of awareness of the social and linguistic challenges that his EBL students experienced while trying to learn science, as well as

strategies he used (or might use) to facilitate his EBL students' language acquisition during science instruction and facilitate their integration in the classroom community.

All the interviews were audiotaped and scheduled individually with each participant to ensure that the interview did not interfere with their instructional time and any other school activities. Class artifacts such as student work related to class assignments, were collected as additional data to assess the connection between these students' social and linguistic challenges and their academic performance in science.

Data Analysis Procedures

According to Miles and Huberman (1994), there are three procedures to analyze qualitative data: 1) data reduction, 2) data display, and 3) conclusion drawing. From an interpretative research perspective, the data analysis process included reviewing the full set of field notes from classroom observations, the transcripts from the interviews, and classroom artifacts to inductively generate assertions related to the research questions. This study used an analytical process as discussed by Bogdan and Biklen (1992) as: "working with the data, organizing them, breaking them into manageable units, synthesizing them, searching for patterns, discovering what is important and what is to be learned, and deciding what you will tell others" (p. 153). A computer software called Nvivo was used to input all the data files.

The sociocultural, sociolinguistic and second language acquisition theories were used as a lens in the analysis of the data by perceiving the classroom as a social environment, targeting observations of both linguistic and non-linguistic behaviors. Through the lens of the sociolinguistic framework, linguistic behaviors were analyzed by using open-coding to search for key linkages among the data that signified language learning in terms of students: (1) level of academic motivation due to language barriers, 2) code-switching use between languages (native/English), 3) processing speed as they interpreted the English language and identified

vocabulary, 4) phonemic awareness such as the recognition of letter sounds and the ability to identify digraphs, and 5) ability to identify and recognize adolescent colloquialism, which is referred to as the use of informal words/phrases and set of norms shared across the board that have acquired their own social meaning.

The sociocultural theory component implies that when EBL students engage in learning and in acquiring a second language, their proficiency in the language stems from individual activities, as well as social interactions. Therefore, in this process of analytic induction, the researcher focused on student's: 1) sense of isolation, 2) participation with others in the classroom both academically and socially, 3) interactions with friends in the classroom, and 4) body language, social distance and orientation towards female and male students/adults specifically focusing on the female participant due to the different social and cultural expectations of the Middle Eastern population towards women.

The field notes from classroom observations were analyzed to identify instances of actions that took place between the EBL students and the teacher, other students in order to identify what counts as participation for the EBL students in the science practices at Thrill-Murray High School. Recurring themes or trends of collaborative activities, social interaction, rich learning environment and cultural influence were examined particularly with the female participants as they are known to encounter greater cultural restrictions and boundaries.

As previously discussed, instructional approaches under constructivism promote second language acquisition due to the high level of student interaction. Therefore, reoccurring patterns addressing EBL student's linguistic, social, academic, and cognitive development in the data helped establish categories such as examining: 1) students social context in the science classroom, 2) strategies the teacher used to promote language acquisition and cultural integration in concrete activities, and 3) the use of conversational language vs. academic language to expand

EBL students' vocabulary in complex science concepts. Such categories were identified and reported in the findings of the study.

Validity, Reliability and Generalizability of Findings

Validity and reliability in this study were established by applying thick descriptions, open minded views, member checking, triangulation, and dedication to eliminating biases. Lecompte (2010) discusses that qualitative studies are not controlled where the researcher can use the same instrument and obtain the same results due to the lack of control in the field setting. Therefore, validity heavily depends on the circumstances of the setting and situation (Lecompte & Schensul, 2010).

According to Patton (2001), generalizability and transferability are criteria for validity in qualitative research. Generalizability refers to generalizing the results of the study to a larger population, whereas transferability refers to the degree in which the results can be transferred to other settings or situations (Lincoln & Guba, 1985). This study's transferability is based on a detailed description of the setting, participants, methodological approaches used in the study and the events observed during data collection. Thick description refers to patterns used by the researcher to draw conclusions that are transferable to other settings or situations (Lincoln & Guba, 1985). For instance, this study focused on Arab EBL students, however, the data collection approaches and coding may be transferable to other EBL population groups.

As a way improve validity, reliability, and transferability in this study, member checking and triangulation were employed. Member checking was implemented during the interview process as a technique to build rapport with the participants and to receive honest and trustworthy responses. This was achieved by granting anonymity to the participants to ensure their freedom to speak freely about their current educational settings. In addition, as a component of the member checking process, the researcher did not summarize the data gathered but instead

transcribed information verbatim from the interviews, and questioned the participants when necessary to verify accuracy and improve trustworthiness based on the interpretation of their experiences. Triangulation refers to the use of multiple approaches when collecting and analyzing data (Curtin & Fossey, 2007). In this study was achieved using approaches to data collection: classroom observations, field notes, artifacts and interviews. Data from these sources were used to corroborate themes identified in the data.

CHAPTER 4 RESULTS

This study investigated the social and linguistic challenges of a group of Arab American EBL students in a US science classroom and the extent to which such challenges affected their academic performance in science. This study also examined these students' and their science teacher's perspectives on strategies that could be used during science class to facilitate their language acquisition and cultural integration. The study used a qualitative interpretive research methodology and involved four Arab-American EBL students (two males and two females) from Yemen, who had been in the US for different periods of time. The amount of time these students had been in the US was important to examine differences in their acculturation and challenges they faced. Similarly, the use of female and male student participants was important to understand the impact of gender in the lived experiences of these students. All four participants attended the same school and were in the same science class.

Data for this study were compiled through classroom observations and in-depth interviews with each of the participants and their teacher. As an Arabic speaking researcher, and because the participants' language skills were limited, conversations between the researcher and the student participants often took place in Arabic. As a result, the results are often translations from Arabic to English of the conversations that took place. The findings presented in the sections that follow are organized around each of the research questions using themes that emerged from the data.

Background of the Study's Participants

At the time of this study, two of the participants, Fatima and Ahmed, who had been in the US for only 6 months, had placed at different levels of English language proficiency based on their WIDA scores. Fatima was placed in the "emerging" (level 2) language proficiency whereas Ahmed was placed in the "entering" (level 1). Mariam and Ali, who both had been in the US for

approximately 18 months, were both classified as "developing" (level 3) English language proficiency level.

Incoming EBL students used to be placed in elective classes for a year to strengthen their English language skills and placed in regular classes a year after their enrollment in the school. However, this approach delayed the EBL students' and the school's graduation rate. At the time of the study the school had changed the policy and all incoming EBL students were immediately placed in science classes. That is the reason the four participants were all in the same biology class. In addition to the biology class, the participants were also taking the following classes: bilingual math, language arts, social studies, and science classes. They were also in non-bilingual elective classes such as gym, art, photography, woodshop, and automotive. The participants attended six classes a day: four core bilingual classes, and two non-bilingual elective classes. Since Mariam and Ali had been in the US for 18 months, during their freshmen year at the school they were enrolled in a physical science class. Therefore, Mariam and Ali were in their second science class, whereas, Fatima and Ahmed were in their first science class.

Fatima. Fatima was a 15 year old sophomore who had been in the US for only 6 months when the study began. Fatima was born in Yemen and raised in a very religious Muslim family with strict cultural expectations. She moved to the US with her parents and seven other siblings comprising of four sisters and three brothers, all born in Yemen. Her father had married twice and both his wives and all his children lived in the same house. In Yemen a Muslim man is allowed to have up to four wives, a practice that many use. Fatima's family received food and cash assistance from the state. Culturally, Fatima dressed in Muslim attire comprised of a black gown, black scarf, a face covering veil known as a niqab. Fatima was terrified of her father because she had witnessed his physical and emotional abuse of her mother. The father's abusive behavior was also expressed toward his daughters. For example, once Fatima's older sister was

caught carrying a phone conversation with a non-relative male. The father became suspicious of their relationship and beat her sister with a belt as he believed she was bringing shame and dishonor to his family.

By the time Fatima arrived to the US, she had completed elementary school but only half of middle school, because her parents often kept her at home to help raise her siblings and finish housework chores. In the classroom, Fatima needed considerable prompting and encouragement to put forth her best effort on tasks as they increased in difficulty. However, throughout the study her confidence and perseverance increased, although she continued to benefit from prompting. Fatima worked hard and occasionally attended afterschool tutoring with her older brother for additional support in her academic classes. The presence of her older brother at tutoring sessions was necessary to relieve the family of the fear of possibly engaging in conversations with other male peers.

Mariam. Mariam, a 16 year old sophomore, had been in the US for approximately 18 months at the time of the study. Mariam and her family had also emigrated from Yemen. She was the youngest of five siblings -- three brothers and one sister. Culturally, Mariam was deeply accustomed to her religious principles and practices including wearing a black gown, black scarf, and a black niqab. Her father had married three times and was extremely busy providing for three wives and five children. Therefore, Mariam constantly felt neglected by her father. When the father was absent the responsibility of enforcing restrictions related to their culture and traditions fell on her three older brothers. According to Mariam her brothers were worse than her father in terms of setting boundaries and limitations. Socially, she was not allowed to have friends of any kind and was prohibited from leaving the house for any other reason except school. Her brothers continuously threatened to remove her from school if she refused to abide by their rules. Even though Mariam was at a legal age to obtain a driver's license, her family

prohibited such acts of freedom until she was married. Her mother was also not allowed to drive and relied on Mariam's father and brothers for transportation.

Academically Mariam was held back when she entered the US school system due to her lack of language skills and credit requirements. Mariam was very respectful, polite, and responsible but did not initiate help when needed. Organizational skills and task completion were Mariam's greatest strengths. Based on classroom observations and artifacts, Mariam seemed eager to learn and succeed academically, regardless of the difficulties she encountered. She regularly submitted class assignments; however, due to her lack of language skills she had difficulty fully understanding the content of the science classes.

Ahmed. Ahmed, was a 16 year old sophomore, who had been in America for about 6 months. He too had emigrated from Yemen with his family for better living conditions and prosperity. Socially, Ahmed was introverted, reserved, and kept to himself. However, as the study progressed, Ahmed became slightly more comfortable, interacting with other students around him particularly with other Arab males. He also seemed more comfortable asking questions in class. Academically, Ahmed had numerous missing assignments in all of his classes and often did not complete his homework assignments and classroom activities. His science teacher was concerned about his low concentration level, lack of effort/motivation, and difficulty remaining on assigned tasks. He had mentioned to his science teacher that he "preferred" not to complete homework assignments because they were "too hard." Ahmed had difficulty communicating simple information and processing meaning using the English language. Based on classroom artifacts, Ahmed had difficulty constructing basic vocabulary words to formulate sentences.

Ali. Ali, a 16 year old sophomore, had been in America for 18 months at the time of this study. Ali, his parents and his siblings (three sisters and one brother), had also emigrated from

Yemen. His father traveled back and forth between Yemen and the US to provide for his family. Ali worked five days a week after school as a stock boy in a gas station to help his family with household expenses. Academically, Ali isolated himself from his peers and repeatedly displayed emotions of anger and frustration. His frustration appeared to be related to his difficulties with the English language. For example, during a classroom observation, students were instructed to write down 10 factors or things that come to mind about genetics. Ali stared at the window with a confused gesture. He refused to participate and complained about the assigned task in Arabic to one of his classmates as the teacher walked away. In response to his difficulties and frustration the teacher consistently kept redirecting him and eventually sat with him to help him with the assignment. Ali's low academic performance and grades resulted in the school's decision to implement an intervention plan to help him fulfill his missing graduation credits. As a part of his intervention plan, Ali was required to meet with the graduation interventionist twice a week to monitor his academic progress.

The science teacher. The teacher participant in this study was a Caucasian, middle age male, who held a Bachelor's degree in education with a concentration in secondary science and later returned to obtain his EBL endorsement. He had been a science teacher for approximately 20 years in the school district. At the beginning of his career he taught 7th grade science but because of his science/EBL endorsements and highly effective teacher evaluations, the district transferred him to Thrill-Murray high school in an effort to help raise the school's standardized test scores and improve its status as a state priority school. During the time of this study, the teacher had been at Thrill-Murray high school for 3 years and taught bilingual and mainstream biology and chemistry classes. His bilingual biology and chemistry classes consisted of all different levels of bilingual students ranging from newcomers to some with high English proficiency.

In this study, classroom observations were conducted only in his 3rd period biology class in which as all four student participants were enrolled. Although the teacher's ethnic, cultural, and language backgrounds were different from that of the students in his EBL classes, his instructional strategies showed respect for his students' prior knowledge and cultural background. Furthermore, because the teacher recognized the interplay between his students' background and their understanding and performance in science, he was very much interested in this study's research questions and possible findings.

Student Participants' Challenges in Science and Impact on their Academic Achievement

Data from classroom observations and interviews with the participants related to challenges and difficulties they faced in their science class revealed several themes discussed in the following sections.

Linguistic barriers and their influence on participants' academic achievement. The data collected from classroom observations, interviews, and artifacts indicated that the primary obstacles students encountered was related to linguistic barriers, which affected their academic and social interactions, and in turn their academic achievement. Analysis of the data revealed that the participants commonly struggled in three areas which impacted their language usage academically: code-switching, phonemic awareness, and ability to understand adolescent colloquialism (the use of informal words/phrases or set of norms shared across the board which have developed its own social meaning).

Code-switching. Each of the four participants struggled with the English language, prompting them to communicate only with Arabic speaking students resulting in limited language development. Additionally, all participants experienced difficulty pronouncing science vocabulary and often code-switched between the Arabic and English languages. Code-switching refers to the participants' use of words from their native language interspersed in a foreign

language conversation. Since the Arabic language contains 28 letters, in addition to fundamental differences in grammatical rules and sentence structure, avoiding interference from their native language proved to be a challenging task for the participants. Two of the participants, Fatima and Ahmed, code-switched more frequently than the other participants, Mariam and Ali, due to their more limited exposure to the English language and linguistic semantics. For example, during a classroom observation focusing on the ecology unit, the teacher instructed the students to partner with another student to work on a lab activity and answer the following question: "How many raccoons can live in this forest?" In this activity, the students were expected to do the following: 1) define a major component of habitat, 2) identify a limiting factor, and 3) recognize the importance of a suitable habitat. The procedure required all students to become "raccoons" and look for various components of the habitat related to food, shelter, and water. During the activity, Mariam and Fatima worked together, while Ahmed and Ali also collaborated. Mariam and Fatima used the key science vocabulary words in English such as food web, food chain, density dependent factors, and niche. However, their definitions of the science terms and overall conversation were done in Arabic. In their dialogue, Fatima and Mariam transferred between the Arabic and English language and added "ing" to the end of Arabic verbs. They used the "ing" rules of the English language to refer to Arabic verbs in past present. For example, when they were collecting data during their ecology lab, Fatima said the word "akteb-ing" to Mariam, where the use of "ing" had no purpose when added to the Arabic word "akteb" which means to write. Fatima was attempting to apply the correct usage of the English grammatical rules to the Arabic language, which resulted in code-switching interference. She also frequently used phrases such as, "homework the girl" instead of "the girl's homework" or "food the baby" rather than "the baby's food," due to the grammatical structure of the Arabic language and its lack of an indefinite article. The challenging task of adapting to new grammatical rules resulted in other

code-switching occurrences such as when in another instance Mariam said "shirt blue" instead of "blue shirt" to describe the color of a shirt. In Arabic nouns precede adjectives, instead of adjectives preceding the nouns as in the English language.

Later during the interview, Fatima explained another difficulty she experienced transferring between the two languages related to gender, which is assigned to nouns and adjectives in the Arabic language in reference to animate and inanimate objects. As she pointed out:

> *Ma ahrouf ishloan atrgum ha* (I don't know how to explain it). But in Arabic everything is like him or her. So when I talk about something that is considered ibnaya (feminine), I use words to show that. And if I talk about something that is considered masculine, I have to show words for boy.

Code-switching interference was evident in class and during the interviews. For example, when Fatima was explaining her fear of asking questions in class, she had difficulties with the correct order of the nouns, verbs, and pronouns used in the two languages as illustrated in the dialogue below:

1. *confuse for me*

   "I was confused."

2. *question the help teacher, but scared*

   "I'm too scared to ask the teacher for help"

These examples show that Fatima struggled with speaking and comprehension of the English language due to L1 interference. Furthermore, since the Arabic language does not consist of a verb "to be" in the present tense, it frequently resulted in linguistic code-switching errors, particularly for Fatima and Ahmed. For example, during a conversation and while referring to a particular student, Fatima mentioned "she good friend," and during the conversation continued to show such difficulties with the language by using expressions such as,

"I playing tomorrow" and "where she going?" Fatima's code-switching interference from her native language's grammatical verb/tense rules resulted in incorrect English speaking.

L1 interference was similarly witnessed with the male participants. On a separate occasion, the teacher said to Ahmed "Ahmed, can you please get the lights?" Since Ali was seated closer to the light switch, Ahmed turned to Ali and asked him to "close the light" instead of to turn off the light. This expression is clearly an interference of the first language, for in the Arabic language the same verb is used when referring to closing a door or turning off the lights. The Arabic to English translation for the term "close," means both to "turn off" or "to shut," exemplifying code-switching. In another instance, Ahmed said sentences such as, "I finish homework mine," and "I ate food mine." As in the Arabic language, the possessive pronoun is placed after the noun to which it is being referred. Later during his interview, Ahmed (speaking mostly in Arabic) elaborated on his incorrect arrangement of the English sentences and misunderstanding of the grammatical structure:

> Yanni (like), I have only been here for a little! yanni (like), I don't really know how to put sentences together; and I am Arabic, I'm used to saying things in Arabic, not English. (Took a long pause and then said). Yanni (like) I know that is a problem.

Ahmed spent a long time trying to describe the possessive pronoun/noun switching since he did not know the terms "possessive pronoun" or "noun" in the English language. He also repeatedly said the Arabic word "yanni" which means "like" in his explanation as he was formulating his sentences.

Phonemic awareness. Phonemic awareness refers to the ability to recognize letter sounds and diagraphs. Since Ahmed and Fatima were in the early stages of English reading acquisition, phonemic awareness was a critical component of their linguistic development. One aspect of the participants' development of phonemic awareness was their ability to recognize the English silent letters. However, since silent letters do not exist in the Arabic language, the

participants struggled with dictation and matching letters with sounds. Ahmed and Fatima, in particular, encountered greater language and linguistic difficulties than Ali and Mariam, due to the fact that they had only been in the U.S. for 6 months and thus had limited exposure to the English language.

Data from classroom observations indicate that a literacy rich environment existed in the science class, which included daily reading and interactive writing activities. Furthermore, the teacher implemented two to three lab activities per biology unit, which often required students to use technology to access information from the Internet. For example, during one of the classroom observations, the teacher took his biology class to the computer lab and instructed them to create a PowerPoint presentation on the topic "loss of biodiversity" using specific criteria that he provided. As he explained to his students:

> Your PowerPoint presentation will be presented in front of the entire class and must include a minimum of 20 slides -- 10 of the slides must include illustrations such as images, charts, and graphs. If you need help with this part, come see me. Make sure that your research presentation includes a written script that explains each slide.

During the activity, Mariam and Ali exhibited greater ability in reading words and in letter sounds than Fatima and Ahmed. For example, when researching the Internet for "loss of biodiversity," Ahmed glanced over at another classmate's computer screen to figure out what to input into the google search box. Fatima, on the other hand, was having difficulties spelling and pronouncing the word "biodiversity." As a result, her Internet search kept directing her to an error webpage because she incorrectly typed the word "biodiversity" in the first three attempts. Fatima repeatedly swapped "b" for "p" letter sounds and "v" sounds were replaced with "f" sounds when pronouncing the term biodiversity. She also frequently added an extra consonant when reading or speaking in English. In a separate case the teacher asked Ahmed to read a short excerpt from his biodiversity search results page. As Ahmed tried to read a three sentence

paragraph, he frequently paused and at times stuttered while attempting to pronounce the words. He replaced "th" sound with "d" sound; because the "th" sound is not part of his native language and therefore had difficulty producing that sound.

As previously mentioned, since Fatima and Ahmed had only been in the U.S. for 6 months, they struggled more than Mariam and Ali with the sounding of words and the combination of syllables and silent letters in the English language. During Fatima's interview she expressed concerns regarding her phonological awareness, particularly with silent letters in the English language:

> It's not easy for me. English is sahaub (hard). I don't know how to say some words. You know in Arabic we read whatever is written down, but in Englisee (English) some of the letters are not said. (In a frustrated tone, says) How am I supposed to know what letters I don't say? Oh well.

Ahmed later elaborated on his poor reading performance during the biodiversity research activity:

> Ufff!!!! ishgad okrah lemin ilmuhlema idgooliee iqrah (I hate when the teacher asks me to read). They know I don't know how to read, I don't know why I even get asked! like I end up feeling embarrassed and ashamed, plus I don't want others to laugh at me because I can't read certain words. And it takes me a long time to say English words because I am not familiar with it.

As a result of their limited literacy skills, Fatima and Ahmed did not pronounce and distinguish between some words such as "bed" and "bad" or "through" and "threw," because the English language consists of more vowels than the Arabic language. In turn, their lack of phonological knowledge of the English language hindered their reading skills and processing speed which in turn delayed their academic progress.

As previously mentioned Ali and Mariam displayed better pronunciation and phonemic skills than Ahmed and Fatima. However, they still struggled with different aspects of phonemic awareness. For example, during one classroom observation the teacher asked the students for the

definition of convergent evolution and selected Mariam to answer. Mariam recited the exact definition in her textbook, slowly sounding out the words with hesitation while struggling with the phonic aspects of the words. The teacher asked: "Mariam, say the definition in your own words" to which Mariam responded, "I don't know." The teacher then presented an example of convergent evolution and awaited a response, but Mariam at this point was puzzled and confused. Ali encountered similar difficulties with distinguishing between English nouns, adjectives, verbs and the rules of punctuation. For instance, Ali's writing prompt assignment on the differences between meiosis and mitosis revealed that his writing failed to distinguish between upper and lower case letters. He used all lower case letters because Arabic writing only involves lower case letters. Moreover, his handwriting was closer to a 3rd grade level -- large letters not organized on the paper line.

Adolescent colloquialism. Adolescent colloquialism refers to the informal language used in casual conversation, particularly by teenagers. The slang terms, or colloquialisms, are culturally influenced by specific social groups relevant to that era. Adolescent colloquialism includes words often exemplified or illustrated by social media such as "turn up, my bad, my crib, frenemy, gangsta, bae, TBT, grind, swag, lol, swerve, hashtag, turnt, YOLO, ratchet, epic fail, photobomb, SMH, and selfie" to name a few.

Classroom observations indicated that all four participants showed difficulties with distinguishing, understanding, and recognizing adolescent colloquialism, which strongly influenced their sociolinguistic interactions with peers. For example, when non-EBL students used these forms of adolescent colloquialism such as "hashtag, WCW, MCM" in the classroom, many of the students in the class laughed and giggled, whereas some of the EBL students, including those in this study, particularly Fatima and Ahmed, seemed confused and puzzled. To further investigate the meaning of these slang terms, towards the end of class, I asked one of the

male non-EBL students, who was involved in the above conversation, what "WCW" and "MCM" meant. He responded,

> Well. (he laughed) it's used to be funny most of the time. WCW means "Women Crush Wednesday." It's basically like this: you post a picture on Instagram, twitter, or vines of a woman you think is pretty or you have a crush on, and usually the WCW picture has to be posted on a Wednesday. Like that's why we were laughing in class, because one of the students had done it (he pointed at a male non-EBL student and laughed). "MCM" is just like "WCW" but it means "Man Crush Monday," and now you post a picture of a man that you have a crush on but only on Mondays.

The student participants admitted that because they did not understand the meaning behind the numerous slang terms (e.g., WCW, MCM) used in class, they were not able to engage in such social interactions with their peers. For example, during his interview, Ahmed mentioned, When asked to further elaborate on his comment, he explained,

> Maraat eesawoon nekhat ahlaya (sometimes my classmates make jokes) and use stuff from Instagram, twitter, or vine (all said with a deep accent). I am not good with the English language, I don't quickly understand words like they say words like "bruh" or "clutch" or whatever.

As a result, Ahmed did not recognize, understand, or apply colloquialisms in his interactions with others, ultimately because he had limited experience and contact with informal language and adolescent slang terms. Ali was somewhat able to make sense of his classmates' common conversational dialogues. Mariam too, appeared to have similar understanding, since she smiled at times when her classmates used colloquialisms for entertainment; however, she never applied such expressions during conversations. For instance, when Mariam overheard one of her classmates yell out "YOLO" (you only live once), after the teacher assigned a lengthy homework assignment. Mariam smiled to the outburst and then placed her head down, while the class continued to complain about the homework assignment.

Conversational language refers to the participant's language used in everyday interactions, whether in the hallways or cafeteria. On the other hand, academic language is the

language used in the classroom and school work such as textbooks, class assignments, assessments, science experiments, and lab reports. The science classroom in this study exhibited its own academic language with a particular focus on biological vocabulary and concepts. The participants of the study showed varying degrees of fluency in both conversational and academic language. Although Ali and Mariam had been in the US for a longer period of time than Fatima and Ahmed, and demonstrated better conversational language skills and ability to recognize colloquialisms when interacting with others, their academic language skills in the biology class were still limited. For instance, they still struggled with instructional activities that required them to use academic language and understand written and oral texts, particularly when involving science terminology. When Ali was asked during his interview about how comfortable he felt with the English language, he stated that he felt particularly frustrated in his science class because of the many different words that were used. When asked a similar question, Mariam responded that when her teacher used science specific language, which she referred to as "big words," when explaining science vocabulary, she felt confused and discouraged.

Ahmed and Fatima expressed even more concerns with the use and understanding of science terminology. For example, when during Ahmed's interview he was asked, "What is the main problem you face in science?" he responded,

> Everything is a mushkalah (problem). You know the language is really hard and each word have different meaning. Talking in English is so hard baa'aad (on top of that), you want me to know the science words. I can't even say them and sometimes they don't make sense to me.

According to Ahmed, math class was easier to him:

> Yanni (like) in science classes, it talks about ahhyaa (nature) and other stuff, a lot of thinking in science. Math is easier for me because it's just numbers. Science has kaleemat sahbah (hard words) that I don't understand. And I don't know how to do it.

Fatima too discussed her struggles with science terminology during the interview:

> You know, science is very hard. And science kelmaat (words) are hard for the students that were born here, think how much harder it is on us. ilmaleema lasm tuhrofna zein awel marrah (the teacher has to understand where we come from first), like know about us. You know like they need to work with me more, talk to me, put me in groups that will help me and not be mean to me. Not the groups that laugh and make jokes that I don't understand and I the just agood ibhadi (sit by myself).

The participants' struggles with academic language were also evident in their work in the science class. In one of the class assignments illustrating the concept of osmosis and diffusion across membranes, the students were required to observe what happened to an egg placed in different liquids: vinegar, water, and syrup. In all three cases, students needed to collect data on the egg's original mass, final mass, and the egg's appearance, and provide a final written summary of their results. When writing the summary portion of the assignment, Ali's work illustrated his difficulty writing in English:

> Today and my partner in class, I finds diffusion and osmosis, mi partner and me put the egg in the vinger (misspelled vinegar). We close buckt (referring to re-capping the jar) and sit 24-48 hours. we opens buckt and take vinger. Outside egg break no strong. We takes the egg and weaghs (weighs) the egg and put egg back in bucket and put syrup and sit 24 hours. open buckt and weaghs egg. Egg was mushy and soft.

Ali's writing shows numerous grammatical mistakes, spelling errors, and lacks proper sentence structure. Mariam too, shared similar writing difficulties in this particular assignment. On the other hand, Ahmed who had been in the US for only 6 months wrote the following conclusion:

> diffusion with the clss (class) and osmosis with the clss the egg no hard ands samal (small) and egg in water seme (same) egg in veengar (vinegar) no seme and egg tame (time) lang (long) in cupp syrup egg samal and egg nathing (nothing).

Ahmed's writing exhibited lesser skills than Ali's and Mariam's. His writing clearly shows that he possesses limited knowledge of sentence structure, punctuation, grammatical rules and the correct usage of upper case and lower case letters. He also uses all lower case letters which is evidence of L1 interference, as previously discussed. Interestingly, both Ali and Ahmed's

writing correctly spelled “diffusion” and “osmosis,” because both of these science terms were clearly printed using large font as the title in the activity.

Social interaction/participation and its influence on participants’ academic achievement. The level of the participants’ social interactions and participation in the science class were influenced by their English language skills and to some extent by their cultural background. Data from classroom observations, interviews and artifacts indicated that the participants’ language and cultural barriers added to the tensions of social interaction, participation, and everyday discourses presented in the classroom. The participants isolated themselves because they struggled when trying to interact with others while adapting to a new learning environment. Their social isolation in turn delayed their acquisition of the English language and negatively impacted their academic achievement. Furthermore, Fatima and Mariam encountered greater social difficulties than Ahmed and Ali because they were adjusting to social traditions that were different from their home country, and their gender-specific cultural values and beliefs restricted them from socializing and communicating with others. This in turn limited their social interaction and classroom participation, and hindered their opportunity to become active participants in group activities. Analysis of the data indicated that the participants struggled in three areas, which impacted them academically: 1) sense of isolation, 2) classroom participation academically and socially and 3) body language, social distance and orientation towards female and male students/adults.

Sense of isolation. In this study, sense of isolation or social isolation refers to an individuals’ emotional and physical separation from others. The participants displayed different levels of social isolation as their development of social skills was strongly related to gender differences and length of time in the US. Their social isolation in turn decreased their opportunities for language acquisition and understanding of academic content. Data from

classroom observations and interviews revealed that social isolation among the participants was more effected by gender specific roles than by duration of time in the US. The female participants, Mariam and Fatima, displayed higher levels of isolation and social segregation due to their cultural beliefs and norms limiting them from engaging in social learning with other students, particularly those of the opposite sex.

This sense of isolation experienced by the female participants was not only the result of cultural restrictions forbidding them from socializing with males, but also from religious practices such as their Islamic attire. For instance, once when the science teacher instructed the students to work in pairs or to create a group, the non-EBL students avoided pairing or initiating group work with the EBL students despite their close proximity in seating arrangements. Furthermore, the lack of social interaction was more evident between male non-EBL and female EBL students, a social distance that was maintained by both groups. For example, during a classroom observation, two non-EBL male students were observed laughing while making derogatory remarks towards Fatima, such as: "it smells, I wonder what she has under that," referring to Fatima's abaya — black long gown. Their behavior made others laugh, which further encouraged the boys' behavior. Although Fatima ignored her classmates' behavior, her embarrassment was clear from the color of her face. Later during the interview, Fatima was asked how she felt about the incident with the two non-EBL male students. Fatima looked humiliated and bothered by the question and refused to answer, claiming that she did not recall such incident. However, when asked if she felt isolated in the classroom and whether she felt safe at school, she responded,

> They (mainstream students) like to ignore me and do not even see that I exist. So like I feel mehktafeya (invisible) in the classroom. But you know, I don't think anyone would physically hurt me but they hurt me emotionally and I have to live with that; and sometimes I say I wish I know English. I can't do good if I am sad.

Fatima further went on to describe the differences of the classroom environment between her country of origin and the US.

> Its very different from what I am used to, first of all, I went to an all-girls school and we didn't have gym. Here we have gym and we have to run in front of the boys. And I am not allowed to wear pants in front of everyone. And in gym class, nobody wants to be my partner.

When Mariam was asked the same question regarding her sense of isolation, she responded,

> Yes; I am always feeling left out and alone in the classroom, but what can I do. And like because I feel that no one wants to be my friend because I am different. So that's why I always stay quiet in the class. Plus, I'm too scared to raise my hand, and you know everyone thinks I'm shy, but I'm really not shy at home. At home (she sighed), I'm the loudest one. I just don't know the language.

Even though, Mariam had been in the US for a longer period of time than Fatima, she was still afraid to express herself in the classroom and expressed herself mostly in Arabic during the interview.

Although, the female participants exhibited a greater sense of isolation than their male counterparts, Ahmed and Ali too, experienced a degree of isolation from others in the classroom. Ali had been in the US for approximately 18 months and thus had developed greater social skills using the English language than Ahmed. For instance, during one of the classroom observations, when the teacher directed his students to collaborate in order to create a meiosis flip book, Ali interacted with others when necessary, whereas Ahmed avoided all social interactions in the classroom. He remained seated alone and refused to participate in group work. The teacher then approached him and placed him in a group with other students, but he remained quiet and isolated himself from others. Later during the interview, when Ahmed was asked why he refused to collaborate with others on the meiosis flip book assignment, he responded,

> Well, when the teacher says "find a partner," they (non-EBL students) all go together and then leave me alone. Like the students never ask me if I want to be with them, like in their group. Even, if I go with them, they do not trust me to do any work because they know I don't know how because of the English.

Ahmed's description of his experience of feeling left out in the classroom, contributed to his sense of isolation and level of participation. In the follow-up question, Ahmed was asked why his interactions with other students were limited. He added,

> Why would I talk to them if they don't like me? You know what I mean. And they (non-Arab students) call me a "terrorist" and that's not people I want to talk to. Ani athoog akthaer (I get more offended) when a "white" student calls me that. Like some want to be funny and say to me, "why don't you go blow things up" or "is Osama Bin Laden your dad because you look like him," they say stuff like that.

According to Ahmed, he had experienced such bullying behaviors "for a long period of time." When asked how he reacted to such incidents, he said:

> Ummmm, I like to say "saker timeak" (shut up), but I know that would just get me in trouble and it really won't make them stop. So I think they say stuff like that just to be funny and cool, you know? But whatever I know they do that to show off in front of their friends. It's like, I usually just ignore them and walk away.

Ali too had experienced negative anti-Muslim discriminatory behaviors, including cyberbullying:

> A couple of times, I don't know who, but kids would write on my facebook "son of ISIS" or "Daesh." I can't really do anything about it because their messages were mahfoutheen (anonymous). It's because of stuff like that, I just keep to myself. I don't know. One time they wrote ISIS on my desk just to be funny. And I knew who did it too but I was too scared to tell the teacher. And I don't know what to say anyways.

Ahmed and Ali spoke further about cultural discrimination and how non-EBL students, including westernized Arab-Americans, often called them "boaters." Ahmed said,

> Like in class one time, the teacher told a student to be my partner and he said underneath his breath "I don't want to work with that boater." You know boater is not a nice thing to say. I know why he said it. He said it, because he was trying to make fun of me because I am new here.

Ahmed went on to describe the meaning of the term "boater":

> For us Arab, when you call an Arab a "boater," it's like calling a black person the "N" word. And I know that's bad. When I came here, my friend told me never to say the "N" word because it is bad. So boater is the same thing, it's used to hurt and embarrass someone because of who they are or yanni (like) where they came from.

In the Arab-American community in Michigan, particularly in the area where the participants reside, a "boater" is referred to someone who has recently immigrated to the US and implies that the person: 1) has few English language skills; 2) is not a good driver; 3) expresses old-fashioned ideas, particularly in terms of women rights; and 4) enforces traditional cultural practices in his family regarding marriage, values, beliefs, and language. As exemplified in Ahmed's above explanation, the term is often used in a derogatory manner, and thus its use in educational settings is considered bullying. Ali added,

> You know what's yeqhar (sad), it's sometimes not only the white kids that call me a "boater." Sometimes the Yemeni boys who were born here or came here when they were babies call me a boater too because they think they are better than us. Like they think because now they are more American, we are not good enough to be their friend. Because we don't dress like them and we don't know what is in style like them.

Ali's feelings expressed in the above quote were corroborated by class observation data. For example, in the hallways during passing time, the recently immigrated Arab students only interacted and associated with each other, forming their own social groups. Similarly, the more westernized Arab students (who were born in the US or arrived to the US as young children) also formed their own social groups.

Classroom participation and student interactions. Classroom participation refers to the students' willingness to engage in class discussions, express opinions and share experiences when given the opportunity. Classroom observations indicated that one of the most effective methods to improve language skills, involved learning through collaboration and communication. For example, the teacher frequently asked students some personal questions about their day or what they had done over the weekend. Such questions enabled the teacher to bond with students on a personal level; promoted classroom participation; and encouraged language development. However, such efforts did not seem to have a significant, positive impact on the social skills of the study's participants, since they were reluctant to engage in such

conversations. All four participants tended to limit their academic and social interactions with others along cultural lines, which limited the development of their social skills and their ability to engage in scientific discourse. This was particularly evident among the female students.

When the male participants were asked about their social interactions with non-Arab male students, Ali pointed out that his dark features, such as black hair and brown eyes separated him from the "white boys" and therefore he was not readily accepted by the white community:

> They know I'm Arabic and they know I don't look like them. I know because I don't look or act like them, they don't want to be my friend. One day one of the kids told me (referring to a "white boy"); if I didn't speak English with them, I can't sit with them on the same table.

Researcher: How did that make you feel?

Ali:

> You know, ani kulish thaeeg min hashagla (I feel like you know so angry) and so mad and I wanted to fight him. I hated that some of them treated me like that. It was mean. I remember, when I went home that day, I told my parents, "I don't want to go to school anymore." But they told me I have no other choice and that I need to deal with it.

Ahmed too, claimed that non-Arab males ignored him and that since he was not able to identify with them, he avoided initiating conversations as well. This generated a cultural distance between him and most of his peers.

All four participants avoided participating in classroom discussions and engaging in social learning. For example, during one of the classroom observations, the teacher instructed the students to work in pairs on the "*human hand adaptation*" assignment. He stated, "Today, you will work on this lab exercise with a partner of your choosing. Take a moment to find your partner and have a seat next them." The teacher allotted several minutes for his class to transition. During that time, Fatima walked over to Mariam to pair up, as did Ali and Ahmed. The teacher then said to his class:

> Alright guys let me have your attention so we can get started. Since we are learning about evolution, and in the past couple of days you have learned that all living things have body parts that are best adapted for their environment and their niche. Can anyone tell me what a niche is?

A male non-EBL student responded: "it's the organism's role in the environment." The teacher confirmed the student's answer and went on to further explain the assignment as he pointed towards his PowerPoint slide:

> Now, let's look at some examples to help you understand this. For example, you see in this picture a fish. The fish has gills so that it can remove the oxygen from the water. Let's look at this picture of a bird, can anyone tell me why birds have spongy bones?

Three non-EBL students raised their hand to answer the question. The EBL students in the classroom, including the participants, never volunteered to answer any questions during any of the observations of this study. During such class discussions, Mariam and Fatima also expressed higher levels of anxiety, compared to Ali and Ahmed. On rare occasions, when the teacher randomly called on Mariam or Fatima, there were observable changes in their demeanor such as stuttering, fidgeting and changes in voice tone. However, under most circumstances, the teacher selected the students who had volunteered to answer, which were mainly the non-EBL students. As a result, the EBL students had fewer opportunities to speak the English language, which in turn negatively affected their language development skills and achievement in science.

Mariam and Fatima also avoided interacting with male students as well as with non-Arab female students. Fatima mentioned that such limitations were predominant in many Yemeni families because of an underlying fear among Yemeni parents that associating with "white people" or "black people" would corrupt their children, due to excessive exposure to American culture and/or values. When during the interview Fatima was asked: "What can your science teacher do to help you become more involved during classroom discussions?" Fatima responded:

> It is very hard on us, shumharufni (I don't even know). Sometimes projects help me and they are more fun. I like to do activities because I can understand better. It's hard to read

> and write in English for me. Like when the teacher gives us instruction, if he writes it down on the board or gives us paper, it is much better because they talk too fast and it's easier to see it. But in front of the class, I'm too scared to talk, that's why I get nervous.

Researcher: "Do you think it's easier for you to communicate when just working with a partner or a small group, rather than the entire class?"

Fatima:

> Eeei dabhann (yes of course), because when it's only a small group, it only has few students and I feel less scared to try to talk in front of them. It's hard to have the courage to talk in English, because I don't know English. And it's hard to make friends when you don't know the language. So at least with a small group I don't feel as akhaff (nervous) to talk. And when the teacher comes by to me, he has to slowly help me, not come talk fast and leave. You know, the teacher needs to be there more often. And when the teacher lectures in front of the class, I don't understand anything I just sit there and be quiet, so I am not learning anything. And when we have test, I do bad. But I do bad because of the Englesee (English), I'm not dumb!

Fatima's inability to speak the English language made her avoid participating in classroom discussions. She mentioned feeling embarrassed when receiving low grades on assignments and continued to justify that "it's the language, it's not me." Fatima went on to explain the reasons for why she remained quiet in class, "I want to try to understand what the students and the teacher are talking about in class. But they talk too fast and I don't know English. And I have to pay attention really hard to follow." These results indicate that Fatima was trying to learn the English language but it was difficult for her to keep up with the dialogue between the teacher and other students and to try to respond back to them. Because she was trying to understand the discourse, the "quiet period" may have been her processing time to acquire the new language and thus was unwilling and incapable of communicating orally. Mariam, experienced similar struggles to Fatima regarding classroom participation as pointed out during her interview:

> I'm afraid to ask questions in class, or like present in class because I know students will laugh at me. And I don't want that. And they will purposely ask me hard questions if I am presenting to embarrass me. That's part of the reason why I don't do good in school. And then I get mad at myself for not doing good.

Another barrier to classroom participation was uncovered during the interview with Ahmed. According to him, class participation, social interactions, and group collaboration were not part of the school curriculum and educational practices in Yemen schools. He further stated that in Yemen, if the teacher asked the class a question, it was considered rude and offensive to raise one's hand to answer. Instead, the teacher selected a student randomly to answer. He went on to explain:

> I wasn't raising my hand in class, not only because I didn't know the language but also because back home (Yemen), we can't raise our hand to answer something. Like we get in mushkela (trouble) in Yemen if we did that because that means you are trying to show off to the teacher and to other students. And they don't like to do group work or talking with others. You had to sit and be quiet. Not like talk to somebody else.

Mariam made similar comments when discussing the educational system in Yemen and added that in Yemen students were prohibited from making eye contact with the teacher, as it was a sign of insubordination or disobedience:

> In Yemen, I was so scared to make eye contact with the teacher because that was considered not right. Like they say it's impolite to look at the teachers or other adults when talking to them, like even my uncles. I always put my head down when talking in those situations. But when I came here, they told me the sheii yakhtelif (opposite). This is so confusing. I think here the teachers get mad at me if I don't look at them when I talk.

These results indicate that cultural differences and unfamiliar teaching methods also contributed to the students' reservations related to interactions within the classroom setting. These challenges were exacerbated because the participants did not attempt to ask for help when struggling with the science content. Their fear and anxiety related to interacting, participating, and asking questions in turn negatively impacted their academic performance on class assignments, and ultimately their grades.

Body language and social distance. The study also explored potential differences in *social distance* and *body language* and their impact on the development of English speaking skills and opportunities to socialize with classmates from different cultural backgrounds. Social

distance, in the context of this study, refers to the degree of personal space that the participants maintained while interacting with others, whereas body language encompasses the range of gestures and movements that they made during such interactions, including facial expressions, hand movements, postures and other physical elements of interaction. Data from classroom observations and student interviews indicate that a connection exists between social distance and body language, and religio-cultural norms and values. For instance, in many traditional Islamic cultures, free association between members of the opposite sex is limited by decree, except under circumstances involving close family members.

Classroom observations uncovered differences in body language and social distance along gender and cultural lines. For example, the interactions between Ahmed and Ali were different from the interactions among non-EBL and westernized Arabic male Students. For instance, during one of the classroom observations, the teacher directed his students to select a partner and begin working on the "*constructing a pedigree"* assignment. He further explained the assignment:

> Your assignment is to construct a pedigree chart similar to the one shown in the Powerpoint slide. You must show links of how the inherited traits are passed on through family history. Make sure you follow your procedure. Get started.

As Ahmed and Ali worked together on the assignment, the camaraderie between them was evident, as was their degree of social detachment from others. While interacting with one another, the degree of personal space between them was notably lesser than the other paired non-EBL male students in the classroom, particularly when seen in relation to general Western norms of social interaction. Their body language during such interactions involved a certain degree of physical contact, such as frequent touches of the other person's arms and shoulders. In fact, during the interview the teacher commented on the close proximity during interactions between his Arabic male students:

> You know some of these boys, particularly the Yemeni boys, always tend to engage with one another by making some sort of physical contact. They are always grabbing each other's arms and shoulders when talking to each other. Sometimes they even wrestle on occasion. I think they do that because they can't interact with the opposite sex, so they feel more attached to their same sex. I don't know, I'm just guessing.

The teacher went on to say,

> Well, I am confused sometimes as to why they display such behavior. But I really believe it is culturally appropriate for them to do it, you know what I mean. The American boys never do that in the classroom, like they don't have physical contact when they talk to their friends. They also think it's weird for them to do that.

This degree of physical contact in same-sex interactions differed significantly from general Western norms, and was noted to cause discomfort among classmates who were raised to adopt Western norms. At the same time, these distinctive differences in social interactions further contributed to the social distance between the study's participants and their non-EBL/westernized peers, thereby decreasing their opportunities to develop English language skills.

The female participants also demonstrated notable differences in their interactions when compared to other classroom members. The social distance that Fatima and Mariam maintained from their classmates was evident during classroom observations. For example, when given the choice, Fatima and Mariam always worked together on collaborative assignments. However, their degree of separation in spatial terms from their peers was much greater than the male participants. In other words, Fatima and Mariam maintained a greater social distance from their classmates than Ahmed and Ali. There were also salient differences in the manner in which Fatima and Mariam exchanged greetings with one another, and with other female members from similar cultural backgrounds. For example, in one of the classroom observations, Fatima and Mariam exchanged kisses on the left and right cheeks as a form of greeting during the beginning of the class period. Kissing one another lightly on the cheeks is an accepted manner of greeting

in most traditional Arabic cultures. When questioned about such greeting etiquette during the interview, Fatima explained,

> It is normal in our culture to kiss someone when saying hello to them like this…..(acted out kissing one's left and right cheek). But we still can't kiss other males when saying hello, but all females are allowed. But if you are kissing a boy like your uncles, brothers, or father, that is allowed, but for sure not strangers. I can get in a lot of trouble if I am seen kissing or talking to a boy, even if he is just my friend.

Fatima further elaborated on gender-specific greeting norms. According to her, an acceptable manner of greeting a member of the opposite sex in most Arab cultures, involves placing one's hand over the chest and bowing lightly. She also added that in more orthodox circles, men and women dined in separate rooms. In such circles, all cross-gender interactions required the presence of an intermediary family member. Religio-cultural differences largely account for this behavior, as in traditional Islamic cultures physical contact between members of the opposite sex, including handshakes, is forbidden, except among family members.

This form of kiss-related greeting was also customary amongst the male participants, albeit to a lesser degree. During the interview Ali explained:

> Back home (Yemen), I always kissed my guy friends when saying hello. But I have now been in America for almost a year and a half, and I know that they don't do that here. So I don't do it as much anymore in school because I don't want other students to give me weird looks. But I still do kiss my uncles and other male relatives though.

According to Ali, this form of greeting is largely used by immigrants; whereas students from Arabic cultures who were born or largely raised in the US tended to forgo this custom. Ahmed further elaborated on greeting practices within families: "If I don't kiss aunts or uncles when greeting them, shows that I am being disrespectful and rude. And in the Arab culture, they usually come and tell my parents about my bad behavior."

Cultural influence and its effects on participants' academic achievement. Analysis of the data revealed that three specific areas of the participants' Arabic culture -- dress code,

family responsibilities, and religious traditions, further contributed to widening the social gap between themselves and their non-EBL and Westernized Arabic peers.

Gender dress code. Gender dress code, in the context of this study, refers to the participants' clothing, with a special focus on female participants. Classroom observations indicated certain distinctive differences in the way the female participants' dressed — not just in relation to American styles of dressing, but also in relation to those from other Middle-Eastern regions. Fatima and Mariam dressed in the most traditional Islamic attire, consisting of a black gown, scarf (hijab), and a sheer veil (niqab) that covered their face at all times. On the other hand, the Lebanese-Muslim female students often wore pants with a head scarf, and as long as their arms and legs were fully covered, their choice of attire was much more flexible. Since the Yemeni culture is more conservative than many other Islamic cultures, when Yemeni females wore pants with their head scarves, it was viewed as an inappropriate dress code. According to Fatima, if other Yemeni students witnessed her dressed in what they considered inappropriate attire, they might purposely inform her family:

> You know the Yemeni culture is very strict. Like we are more strict than other Arabs. And so my parents are very strict about what I wear. All Yemenis are like that. If they see you wear like pants or something, they tell your family.

However, in some cases, female Yemeni students arrived to school dressed in traditional Muslim attire and changed to clothes such as pants that their parents would consider inappropriate. During the interview Fatima elaborated on this point:

> Some Yemeni girls, when their parents say no to dressing in pants, they come to school wearing the abaya (long black gown), but when they get to school they go to the bathroom and change and wear pants and stuff. Those girls don't know what they are doing, they are stupid because they get in big trouble if their parents find out.

When further exploring this topic during their interview, Fatima and Mariam both mentioned that their parents required them to dress only in the traditional abaya (a robe-like

dress usually black) and niqab (face cover). According to Mariam, such attire made her stand out which bothered her:

> You know back home (Yemen) I didn't feel different wearing a hijab (scarf) and niqab (face covering), yanni machnet ahtem bei (like I didn't mind it), but here it's so different. And people look at you different too. And sometimes that makes me feel different from them, so I just don't talk to them.

As Mariam spoke she lowered her head and seemed sad, struggling to convey her words in English and often code-switching. Fatima, on the other hand expressed irritation about the lack of understanding that some of her peers showed towards the way she dressed as illustrated in the excerpt below, which connected an experience she had with two non-Arab female students who had asked her whether she wore a head scarf because she was bald:

> I mean, trust me, I know they (non-Arab, non-Muslim females) know it's my deen (religion). They know why I have to wear it, but like they just want to act dumb and they want to be funny. They just don't care if they hurt someone because of mean stuff they say.

When Fatima was asked how she responded to them, she said, "I just ignored them and went to the bathroom. I was crying in there and I didn't go to class." Even though Fatima's tone displayed anger, her voice cracked and she began to stutter. When Fatima became emotional during the interview, she switched from speaking in broken English to using only the Arabic language.

Family responsibilities and cultural norms. The participants, particularly the females, experienced distinctive family responsibilities and cultural norms, which impacted their academic achievement. For example, three out of the four participants had fathers who had two or more wives (polygyny), which increased their family responsibilities. Historically, polygynous marriages were implemented as a concern for the welfare of widowed women and orphans, since many Muslim men were killed in wars leaving their wives and children without a means to provide for them. However, such practices continue to be accepted in some of the less

westernized countries such as Yemen, Saudi Arabia and Iran. For the study's participants, their family's practice of polygyny resulted in additional home responsibilities, particularly due to the large number of siblings. When Mariam was asked how she felt about her housework responsibilities, she stated that because she had multiple siblings to care for and extra chores at home, she was unable to complete her homework assignments. As she pointed out:

> I have lots of brothers and sisters, and I love them all. But I also have to take care of them. I have to make them food and clean, and give them showers, for the little ones. And that's a lot of work sometimes I don't have time to even do my homework.

Mariam further mentioned that such responsibilities caused her to become physically and mentally drained at school, which in turn led to disengagement from the learning process. Ali also had responsibilities at home, which potentially impacted his academic achievement. During his interview, Ali mentioned that he worked after school at a gas station five days a week to help his family with expenses:

> It's not like I want to work that much, but I have to. I have to help my mom and dad. You know my dad goes and comes from Yemen, so he is not with us all the time because he has another family there (referring to his father's second wife). So I have to be the man when he is gone.

In addition to playing the role of providers, one of the key roles of males in traditional Arabic societies is as protectors of the family's honor as illustrated in an incident that Mariam described involving a fight that took place at school between her older brother, who also attended Thrill-Murray high school, and a Caucasian male student. The fight initially escalated because the Caucasian student was seen trying to sit next to Mariam during lunch. Such an innocent gesture was viewed by Mariam's brother as an inappropriate behavior that bore shame and dishonor on his family. As a result, he was obliged to protect his sister's reputation and his family's honor by engaging in violence. As Mariam reported:

> I don't know why he (her brother) got so mad. The boy (white student) really wasn't doing anything. But my brother got so mad. He thought he was trying to talk to me and he (brother) told my parents and made a big deal. He's annoying.

As a result of the fight, both students were suspended and received community service as part of the school's disciplinary policy. However, her older brother's behavior was praised by the Arab students and his family for partaking in a violent act in order to protect his sister's and family's honor. According to Mariam, "My family was happy about the fight, because they think he was protecting me." Although the incident only involved the two particular students, some of the students in the school took sides, resulting in greater social isolation and reinforcement of their cultural beliefs as illustrated by the sequence of dialogues recorded in the school's hallways:

> Arab student 1: Seriously, stupid white kid -- did he really think he could take on Haider? (Haider is Mariam's brother who was involved in the fight)
>
> Arab student 2: Damn racist (engaged in further inappropriate name calling)
>
> American student 1: These damn Yemeni's need to go learn some English.
>
> American student 2: These boaters need to get out of the way before they get knocked out.
>
> American student 3: These Yemenis smell horrible, this boater-hall (B-hall) smells like garbage.

The school hallways were designated by letters, and B-hall, referenced by American student 3 as the "boater-hall," was the location of all bilingual classes. Therefore, the majority of students in B-hall were Yemeni EBL students. On a separate occasion related to the aftermath of the fight, two American female students in the classroom were overheard saying:

> American female student 1: So my mom somehow heard about the fight and she asked me whether I feel safe coming to school with Arabs.

> American female student 2: I don't blame your mom; they (Arab students) are so annoying.

These views expressed by students from different ethnic groups served to further isolate each other, which in turn decreased EBL students' opportunities to develop English language skills and cultural competency.

Other cultural norms that emerged from the data included lack of affection that some of the participants experienced at home. According to Mariam, during their children's childhood years Arab parents show love and affection. However, as their children approach adolescence, affection is perceived as leniency which is believed to take away from the parents' role of strict disciplinarians. Mariam further clarified:

> When the kids are young, the family hugs them and kisses them a lot. You know like with babies. But when they get big, they don't hug them or kiss them anymore because they want to show they are tough.

This sentiment was similarly expressed by Ahmed. According to him, in the Arabic culture affection from parents was non-existent towards the male adolescent.

Another theme that emerged from the data was the lack of a home environment that promoted literacy, whether it was parent facilitated reading or a child engaging in reading unaided. During the interview, Ali mentioned that only a few households he knew encouraged reading and literacy development, and that his household was not one of them because his mother was illiterate and his father was occupied providing for the family. As Ali pointed out when commenting on differences between himself and his non-EBL peers, "my parents can't help me if they don't know how to read and write in English."

The female participants also faced one additional burden as members of a conservative Arab society: to marry at a young age to relieve their families of the responsibility of providing for them and protecting their honor. According to Fatima, such cultural tradition resulted in

uneducated and illiterate Arab women, as some are forced to drop out of school to pursue marriage and concentrate on their marital responsibilities and duties. Fatima also pointed out that traditional Arab marriages are usually arranged and often take place between cousins. According to her:

> They (parents) want to marry us early to get rid of us. You know sometimes I say, "Maybe it's better to get married now, because they are so strict with me." And I don't know if I want to marry my cousin, but maybe they will tell me I have to.

Fatima further stated that, because her culture did not encourage literacy development at home and encouraged female withdrawal from school in order to marry young, she felt little incentive to focus on school work. Mariam too felt that she would not have a choice in whom she would marry, since in her culture dating was considered equivalent to inappropriate sexual activities. As she pointed out, "dating is no way allowed, that's something you can never do."

Religious traditions. The cultural norms that the participants followed were highly influenced by their religion of Islam, which required that they engage in wudu and the five daily prayers, consumption of only halal meats, and fasting during Ramadan. These religious requirements in turn affected the participants' opportunities to learn.

One of the five pillars of Islam, and the most important, is the five formal prayers set at different times throughout the day. Before prayer both the male and female Muslim students participated in "wudu" referred to as the physical and mental cleanliness initiated before every prayer. Wudu consisted of a multistep process beginning with the removal of shoes and socks; washing hands, arms, feet, and face three times while reciting religious passages. During classroom observations, several Muslim students including Ahmed and Ali were seen leaving the classroom for approximately 15 minutes to "wudu" and conduct daily afternoon prayer known as "salat." The school had set aside a quiet clean area for Islamic students to use for prayer. The prayer area was an empty room with no windows near the nurse's office. When preparing for

prayer students set their shoes aside, laid out their prayer rug, and faced the "Qibla," the direction of the Kabah (the house of god in Mecca), which all Muslims must face when performing prayer. The male and female students separated themselves from each other during prayer, with the females forming parallel rows behind the males within the designated prayer area and one of the male Muslims lead the prayer ceremony. Often the non-Muslim students giggled when passing their Muslim peers while praying in the prayer room during school hours. During the interview, Ahmed mentioned that although such behavior had bothered him, his peers' conduct no longer upset him:

> I know some of them (non-Muslim students) like to laugh when they see us pray. But I know God will punish them. It used to bother me when they said stuff and laughed, but now I'm kind of used it; I just ignore them.

Since the prayers were done during school hours, students sometimes missed valuable instructional time. For example, when Ahmed and Ali returned to class after prayers, they occasionally missed portions of their teacher's direct instruction, which led to confusion on several class assignments. They in turn used their confusion as an excuse to not complete their assignments.

Interestingly, Mariam and Fatima were never observed participating in daily prayers, even though they wore the traditional attire of devoted Muslims. When questioned about it during their interview, they mentioned that their parents forced them to wear the traditional head scarf (hijab) and face covering (niqab). In other words, their devotion to the traditional Muslim attire was less connected to their religious practice than to cultural beliefs, enforced by their families, about the role of women in their society. According to Fatima, Arabic Muslim families' particularly Yemeni, believed that once a female reaches puberty she must wear a hijab or it would convey shame and dishonor to the family's name.

Other aspects of their religion that sometimes interfered with their opportunity to learn was related to the Islamic law that Muslims are permitted to eat only "halal" meats and absolutely refrain from consuming pork meat. Halal meats are slaughtered in a specific way performed only by a Muslim while praying in the name of Allah. With the rapid increase of Muslim students in the school district, they were required to accommodate Muslim students and provide halal meats for lunch. However, because of the limited supply, the school often ran out of halal meats. During the interviews some of the participants mentioned that sometimes they were unable to eat lunch at school due to the limited amount of halal meats offered, and had regularly suffered from headaches, dizziness, and nausea due to their reduced food intake. As Ali pointed out,

> Most of the time, I just end up eating chips and stuff because they don't have anymore halal food. And sometimes that's not enough food for me. Sometimes I even stay hungry because I don't want to eat cheese every day.

Ali further admitted struggling with hunger, which had frequently caused him lack of concentration and focus in the classroom. On the other hand, Ahmed and Fatima stated that it was difficult for them to understand the choices that the school cafeteria offered due to their short duration of time in the US. Fatima then went on to say that sometimes she refused to eat at school due to the unique food choices, to which she was not accustomed:

> I'm not used to the American food and I really don't like it. I just wait to get home and then I eat. I don't know what pizza or hot dog is. We don't have that. The Arabic food we have is very different than what they give me in school.

Like Fatima, Ahmed encountered similar issues regarding the choices of food at school. When the participants were asked about the consequences of consuming non-halal food in front of others, they responded that they would be bullied and ridiculed by other Arab Muslim students because consuming non-halal meats was viewed as a sinful act in Islam.

Another religious tradition that the participants had to follow was fasting during the month of Ramadan. Muslims observe Ramadan to honor the first exposure to the Quran of Prophet Muhammad. The month of Ramadan lasts for 29 to 30 days depending on the visual detections of the crescent moon. Muslims are obligated to fast unless suffering from an illness, pregnancy, breastfeeding, or menstrual cycle.

During the month of Ramadan, and as mandated by the Islamic religion, the participants fasted from sunrise to sunset and refrained from eating and drinking during that time. In addition to being the hottest time of the school year and the longest, the participants' fasting period lasted approximately 18 hours out of a 24-hour day. The school district implemented several accommodations for its Muslim students during the month of Ramadan, including: beginning summer school an hour later than usual; allowing fasting students to sit in the library during lunch time; and carrying out sports practice from 11:00 pm to 1:00 am to ensure that students were able to drink water and other fluids during their physical training.

Data from classroom observations during the month of Ramadan revealed differences in the participants' behavior and academic performance during that period, when compared to the rest of the school year. During Ramadan the participants looked tired, unmotivated, and uninterested in learning. Ahmed and Ali were observed falling asleep several times during class instruction, and when given class time to work, they seemed confused and too exhausted to engage in class tasks. Fatima and Mariam also displayed lower concentration and participation during that time. The participants were also often absent or arrived to school late and analysis of artifacts indicate that they often turned in homework assignments that were incomplete. All these issues negatively affected their achievement in class, and when realizing their low performance scores, they became angry and frustrated. Such frustration in turn caused them to further disengage from the learning process.

While discussing these issues during the interviews, the participants indicated that their irregular sleeping patterns related staying awake at night and early attendance to summer school, while refraining from food and water, interfered with the quality of their performance and cognitive functioning. Ahmed described his Ramadan days as being tired, hungry, and sleepy, which impaired his ability to be alert and responsive. As he pointed out,

> It's so hard to fast and do good in school. Because when you fast, you are hungry and when you can't eat you get really tired. For me, I can't even pay attention because I'm so hungry, I just think about the time for when I can eat.

Like Ahmed, Fatima mentioned that she could not understand how her teacher expected her to fully understand the content when she was consumed by religious obligations, which affected her performance in the classroom.

Even though women are excused from fasting during the month of Ramadan during menstruation, according to Mariam, many Muslim female students continued to fast because doing otherwise was viewed by others as lack of commitment to their religion or made public the fact that the female was menstruating. She said:

> Even if I can't fast because it's the time of month. I still don't want to show others that I am not fasting. That is embarrassing. So in the school cafeteria, even if I am not fasting, I don't eat. Because if I eat they will know, and that's embarrassing.

Participants' Perceptions of their Social and Cultural Identity

Most of the data related to this research question was obtained through the participants' interviews. When the participants were asked about their identity, whether they considered themselves Arab or Arab-American, most of them responded that they identified best with being Arab:

> **Ahmed:** Of course Arab! I'm not American and nor will I ever be. They call me names and treat me bad all the time and you want me to call myself American. I'm Arabic and I'm proud of it.

Ali: I'm a 100% Arab. I would not trade my culture and religion for anything.

Fatima: I'm Arab not Arab American. But I'm not against the American culture.

Mariam: I'm Arab American.

Even though, the participants were Arab-Muslims and thus shared similarities in terms of religion, culture and historical traditions, they exhibited some differences in their perception of their identity. As illustrated in the above statements, Ahmed and Ali stated more forcefully their Arab identity than did Mariam and Fatima. Also, Mariam, who had been in the US for a longer period of time than Fatima, appeared to have begun her transition to an Arab-American identity. Thus, duration of time in the US appeared to have had a greater impact on the female participants than on the males since Ali, who had been in the US for the same amount of time as Mariam, considered himself "100% Arab." The females' greater attraction to the American culture and values might have been the result of the strict gender-specific roles and restrictions that they experienced in their native culture, which were consistently enforced by the members of their family, particularly the males. For example, the participants frequently mentioned their parents as their source of knowledge about their Arabic culture and Muslim religion. As Mariam pointed out, "I am not allowed to go out, my parents are very strict. They do not let girls out of the house, only for school, not even work. We are not allowed to do anything fun for school." Fatima too, spoke of the restrictions that her parents imposed on her, which she felt were greater than when she lived in Yemen:

> It sucks being here. I told my family I wanted to go back home, but they told me we can't because we had nothing back home. Because we are in America now, my parents are more afraid now to let me out of the house. Because they know how Americans are here, you know they think they are too open-minded and they don't want me being like one of the "American girls". So that's why they are more strict now, back home it was easier for me.

Fatima's statement: "It sucks being here. I told my family I wanted to go back home" did not appear to be made because she did not like the American culture; it was because of the increased family restrictions she was experiencing, which forbade her from participating in aspects of the American culture such as prom and other school associated events. Mariam and Fatima would gladly participate in such activities had their families allowed them to do so. These restrictions, including their dress code, limited their interactions with others and prevented them from developing cultural competency as Arab American women.

Unlike the females, the male participants enjoyed the privileges connected to the masculine identity that their Arabic culture and Muslim religion afforded them. As Ahmed pointed out when discussing the restrictions that the Arabic females experienced,

> We are men; we don't have to worry about our reputation like the girls do. We can do a lot more than the girls can. Yanni mustaheel (like impossible) to let them do whatever they want. Back home (referring to Yemen), girls and boys are in separate classrooms, usually when they are 9 or 10 (age), they get separated because of our culture and religion, and the girls there all wear the hijab (head scarf) and niqab (face veil). And that's how it should be. We have to watch over the girls, so that they don't do anything wrong.

Ali, although he had been in the US for 18 months, felt the same way as Ahmed:

> The rules are sahhh (right) and appropriate, we have to be strict on the girls or else we lose them. My dad told me I have to be strict on my sisters so they don't do anything wrong. Because if they do something wrong, it shows bad for my entire family, and no one would marry them.

Not only did Ahmed and Ali espouse an Arabic cultural identity, they felt responsible for defending and enforcing such values on the female members of their family. These beliefs helped shape their masculine identity as strong male authoritarians with the responsibility to protect and defend their family's honor.

Another aspect of the Arab culture, which the female participants were beginning to realize, and perhaps to question, was the lack of appreciation for female education. For example,

when describing the Arabic culture's influence on the development of her identity, Mariam mentioned that her parents did not appreciate educating women, thus further killing any ideas of a college education:

> My parents don't care about school. They want my brothers to do good, but they really don't care about the girls doing good, because they know we are just going to get married and take care of a family. It's hard to care about school when your parents don't care.

She added that in the Yemen community parents rarely allowed their children, males or females, to move out of their parent's house, unless they were married. According to her, "you can only leave when you are married, you are stuck there. And if you are a girl, for sure you cannot leave. Yanni(like) even if you want to go away for college, you really can't."

Given the focus of the culture on marriage and family duties as the main roles for women, it was difficult for females to value education. As Mariam pointed out, "there is no point in pursuing school." Fatima too mentioned that her parents did not value her education:

> In the Yemeni community education is looked at to be only for the boys. Boys can go to college but girls cannot. We have to get married and raise a family when we are young. A lot of Yemeni parents actually make their daughters drop out of school. My parents want me to finish high school because we are on welfare, we get help from the government.

According to Fatima, she never received parental support with school work, and her family was mainly concerned with preserving their cultural values rather than her education:

> They just care about your reputation. You can't date or talk to boys, or any of that stuff. When you grow up in a strict house, it becomes who I am. I can't go to school and talk to boys and go to dances. We have to stay quiet and respectful.

Fatima added that graduating from high school was unprecedented among the Yemeni female students, and if high school graduation was pursued, they were only concerned with meeting the minimum requirements for graduation, since they would not attend college. Fatima spoke about various Yemeni female students at Thrill-Murray High School who were engaged, married, and even pregnant, since this was viewed as a norm within their cultural upbringing. Early marriages

are common in the Yemeni culture and framed Fatima's outlook about her future. As she said, "I know my parents want me to get married soon. If someone comes to ask for my hand now, they will say yes." She added that Yemeni parents were mainly concerned with the US citizenship status of their daughters: "US citizenship means more money for the parents when girls get married." The "money" connected to US citizenship is associated with their marriage dowry. A US citizenship status is worth much more when a girl is sent back to Yemen for marital purposes. A dowry is a marriage contract in which a payment is given to the bride's family by the groom (or his family) before the marriage takes place. The concept of dowry is relatively in traditional Arab cultures such as Yemen.

The repressive environment the females experienced combined with exposure to some of the American cultural values that their non-EBL peers enjoyed, appear to play a part on Fatima and Mariam's greater openness to the American culture, even if they could not make use of the befits that it provided them. As Mariam pointed out:

> My cousins and I always talk about how easy it would be if we were American girls. We would have so much freedom; we would not know what to do (laughs). I mean when you're an Arab girl, you can't go out or work, unless you get married, but then you have to get permission from your husband. Sometimes, I look at my cousins who are married, and they hate living with their husband because some of them are stricter than their parents.

This view was similarly expressed by Fatima:

> I believe that my culture (Arab) is very hard on females and it would be nice if they gave us a little freedom. Not the freedom like the Americans have because they have way too much freedom, that's not good either. That's why it's hard to get used to being here, because I can never be like one of the American girls, you know because the religion and stuff. Plus they will never look at me like I'm one of them anyways.

Mariam and Fatima were conscious of their dissimilar lifestyle experiences compared to their American peers. Such unique experiences were shaped by the sociocultural practices of their Arabic culture. Since they spoke only Arabic at home and often at school, their native

language also helped frame their identity and played a crucial role in their identity development. The participants' unique culture and language made them stand out, and given their negative experiences with their American peers, they felt little connection to the mainstream culture. Even Mariam who had been in the US for 18 months and considered herself "Arab-American" struggled with trying to navigate the two cultures as illustrated in the following excerpt from Mariam's interview:

> I am not happy in school. I am sad all the time and sometimes I want to cry. I wish the students were more welcoming here. I just don't belong here, they don't understand me and I don't understand them. The language is a big problem and I don't fit in here. I would do anything to be fluent in English and be good in school and have friends.

Mariam reported that trying to adapt to a new culture while resisting to avoid "Americanization," was a continuous struggle. As she began to elaborate in more detail about her level of acculturation and self-image and conflict between her "American vs Arab identity," she became tearful as she spoke:

> I lost my sense of humor and personality in all of this, I only speak when I am asked a question, and am always hiding my own ideas and opinions because I'm too scared to share them. I don't know how to be funny here. This place changed me.

When asked to further clarify about what she meant by "American vs. Arab identity," she responded that in Yemen, her identity was recognized as "the fun, crazy outgoing-one and known as the class clown." She referenced her lively personality as her Arabic identity, and her American identity as "boring."

The male participants also reported experiences of cultural struggle, discrimination, and rejection, which helped shape their perception of their strong identity as Arabs. They encountered greater stereotyping experiences than the female participants, which further alienated them from the mainstream American culture. For example, during Ahmed's interview and when asked how the students treated him initially when he arrived to America, he replied,

"we fought; they used to call us 'boaters', and they still call me a boater or sometimes a terrorist." He referenced "fear, anger, hopelessness" to describe his feelings towards such remarks. Ahmed seemed "uncomfortable" when describing his language deficiency and culture. As he pointed out,

> I don't really like to talk about these things. Ahseer khaief ooo mertebek (I get afraid and nervous). I don't even know why (long pause)…. It bothers me that I don't know the language and that they make fun of me, I kind of feel handicapped and not happy with myself.

According to Ahmed, the cultural differences he encountered made it difficult to adjust to a new culture. The "teasing" from other students and his difficulties with the English language heightened Ahmed's sense of being different, thereby slowing his transition to an identity that contained some of the American cultural values. Like Ahmed, Ali too experienced similar struggles with the American culture as expressed by his mainstream peers. As he pointed out when commenting on how other students treated him as an Arab EBL student he replied:

> They are not nice to me. Like saying mean words and making fun of me and others. It's not easy to talk to the kids if they don't want to talk to you. And they are always showing off by saying mean Arab or Muslim jokes. And I hate those who show off. And I do not feel comfortable and shajuah (confident) to talk to them because of the language. When I try, I get so nervous. My hands start sweating and my heart starts beating fast.

Ali went on to say that other male students, tried to act "cool" and "strong" by bullying him. He said,

> You know, it's hard to be yourself when others keep putting you down, sometimes that makes me just shut down. They made fun of my jeans, calling them boater jeans because I got them from Yemen. They think they are funny, but they really are not. I'm happy about being Yemeni.

Because Ahmed and Ali were not accepted by their peers and felt they did not belong in the new environment, they were more inclined to defend their Arab culture and consider themselves mainly as "Arab."

Arab American EBL Students' Perceptions of their Educational Experiences in the US

Some of the interview questions were used to assess the students' perceptions of their educational experiences in the US. Data revealed that the female and male student participants shared similar positive and negative perceptions of their educational experiences in the United States.

Positive perceptions. The participants' positive perceptions included their belief that the US educational system is strong -- perceived as the "best" in the world, and that the US education system has favorable discipline policy. As Ahmed pointed out,

> All of us, like coming from Yemen, our families bring us here to have good education. Everybody in the world thinks America is the best and education here is the best. That's why my parents left their country for us to have a better life.

Ali indicated that prior to coming to the United States his perception of the US educational system was that it "was going to be a dream come true" and that "school in American was going to be like heaven."

Another positive aspect of the US education system that the participants mentioned was the school's discipline policy, to which the participants were happy to adjust. According to Mariam and Fatima, the school's discipline approach involving warnings and suspensions was mild, compared to the corporal punishment used in their home country. Classroom observations revealed that all participants obeyed authority and showed the utmost respect for their teacher. Since corporal punishment is relatively common in Muslim schools as an approach to classroom management, fear of such consequences was widely recognized among the participants. As Ahmed said, "I'm scared to get in trouble; back home they used to beat us. But here its different, they don't beat you." Ali shared similar feelings about schooling in Yemen:

> Getting in trouble in Yemen was terrifying and the teacher would get mad about the smallest things. Like if you talk in class or raise your hand to say something. Or if you

> want to use the bathroom -- you have to wait for a long time; you can't just ask and go like here.

He further stated that such fear stood in the way of him taking risks in the classroom such as asking the teacher for help. Questioning or asking for help in Yemen classrooms demonstrated lack of understanding for which the participants were punished. Ali specified that this form of educational approach was relatively common, particularly in Yemen villages and was sanctioned by educational leaders and parents.

EBL students, particularly the newcomers, were appalled at the disruptive behavior expressed by their non-EBL peers such as using their cell phone and talking in class. During the interview with Ahmed, he indicated that in Yemen the teacher held high authority and disobeying the teacher's authority or receiving "bad grades" resulted in beatings and hand smacks, usually done with a ruler.

Negative perceptions. The participants also expressed negative perceptions of the US educational system, which included a sense of isolation, religious discrimination, and adapting to a new education system uniquely different from what they had experienced in Yemen. According to Fatima:

> I really thought it was going to be different here. But when I came here, I saw how mean everybody was. Maybe they just hate Muslim people or Arabic people. I don't know. And when you come here, you really don't know anything.

She went on to say, "maybe they don't like us because we don't talk in English or because of the TV." Each of the four student participants perceived their language to be a barrier in the classroom, which further reiterated their minimal interactions with other students. Mariam stated that, "if I was better with the language, I could make friends. And I probably would like it here." Ahmed acknowledged that "the language is hard to learn especially because I am still new here."

The participants also had negative perceptions of some aspects of the US educational system such as extracurricular activities and the grading system. None of the four participants partook in their school's extracurricular activities, such as science club, chess club, band, choir, sports, which they felt were worthless. Ahmed stated:

> We don't have stuff like that. And back in Yemen we didn't do clubs and stuff. Yanni (like) why would we do it here then. Plus stuff like that does not mean anything to us or to my parents.

Like Ahmed, the other participants responded that their parents did not allow them to stay after school or attend weekend events. Since such activities are not part of Yemen's educational curriculum, Yemeni parents found no value in allowing their children to participate. Such restrictions were enforced to a greater extent with the female participants. As Fatima said, "I am no way allowed to join those clubs, in fact, not just me, usually all girls from Yemen are not allowed. That's why we don't care about being in those clubs." According to Mariam, her parents prohibited her from enrolling in choir or band class because it contained music which was considered "haram," or forbidden by their Islamic beliefs. As she pointed out:

> I don't want to be in them anyways, it's pointless! Plus they're for the white kids not us. My parents don't care about stuff like that, they think it's wrong and it's not important. They think school should be only about reading and writing. So no music or art or gym. Actually if the Yemeni's see Arabic students in band, they make fun of them because they think that's only for American students.

As a result of their parents' cultural restrictions, they developed a negative outlook towards such activities and thus avoided participating.

The second educational factor in which the participants reported experiencing challenges was the grading system. Their negative perception was the result of their confusion about a grading system to which they were not accustomed, not necessarily because they favored their school's grading scale in Yemen. Academic grades in the US educational system denote value connected to the quality of student performance in school subjects. Grades are traditionally

assigned of A, B, C, D, and F letters, in which A signifies the highest quality of work and F the lowest -- denoting failure. The participants appeared to have difficulty understanding such system. As Fatima said, "It's so different here from Yemen. In Yemen, we don't have ABC stuff." Ahmed stated,

> If I don't know how to read what I got, how am I supposed to know whether I did bad or good? I mean, if I know I did bad then I know I have to try harder to do good. This makes hard on me. In my country, I did good all the time in school.

The participants' confusion with the grading system was also reflected in their behavior in the classroom. For example, during one of the classroom observations, when the teacher returned a graded assignment on "evolution," Ahmed and Fatima instantly set their graded assignment aside without acknowledging their grade or reading their teacher's feedback. Ali and Mariam, on the other hand, did glance at their assignment grade, but did not read their teacher's written feedback. Later during the interview, when Ahmed and Fatima were asked why they disregarded their teacher's feedback, they both mentioned that they were frequently confused about the grades they received on their assignments. They further elaborated that the confusion occurred because they were not familiar with the letter grading system nor did they understand the levels of markings within a single letter grade. Fatima went on to say: "what's the point of reading it, if I don't understand what it means." She shook her head, and said, "I'm just frustrated, it's hard to get used to a new school."

Teacher's Awareness of EBL Student's Sociolinguistic Challenges and Instructional Strategies Used to Facilitate Language Acquisition and Cultural Integration

Data from the interviews with the teacher and classroom observations indicate that the teacher was aware of his EBL students' sociolinguistic challenges in the science classroom and that such awareness had developed over time. Analysis of the data uncovered three themes related to the teacher's awareness of his EBL students' struggles: social, linguistic, and cultural.

Data from classroom observations also indicate that his awareness was reflected in his teaching practice.

Social awareness. During the interview several questions were used to gauge the teacher's level of understanding of his EBL students' social struggles. According to him, the presence of Arabic EBL students required him to have an understanding of their social norms and learning situations exemplified in his classroom. For example, because he was aware of the social norms of the Arabic culture such as girls not being allowed to interact with the boys, he did not use a seating chart to force them to sit next to each other. As the teacher explained:

> I know my Arabic boys and girls can't sit by each other, that's why I don't do a seating chart. And if you noticed when you walked into my class, the girls all sit on one side and the boys sit on the other. Throughout the entire class they don't talk to each other, in fact, they don't even look at each other.

When asked how such understandings were reflected on his interactions with female Muslim students he responded:

> The girls never come up to talk to me or ask me questions. Even if they do not understand something or need help, they still will not come up to ask for help. I think they are just scared, and not knowing the language makes them even more scared.

He also stated that on rare occasions when female Muslim students approached him to ask a question, they refrained from engaging in eye contact with him, "because I am a male, they are not allowed to make eye contact with me." The teacher added:

> I was confused at first as to why they did not make eye contact when they spoke to me, but later I realized it was because of their culture or religion. Or maybe a little bit of both, I'm not really sure. But at least I know not to get offended, right.

He further admitted that additional background knowledge of his students' social and cultural differences was necessary to better integrate language acquisition and reading instruction into his classes. "I know some things about their background, just from what I see in the classroom, but I really don't know everything about them." He realized that in order to develop scientifically

literate students they must take an active role in social learning and develop knowledge, skills, and confidence that will enable them to understand what it means to do science and participate in a larger scientific community. He stated,

> My students, especially my EBL students, have to do group work or participate in class activities so that they build on their language skills and vocabulary. When they know the language, they will be more confident to use it, and this will allow for learning to take place. I know science is not easy for them, science is hard for my mainstream kids let alone my EBL kids.

Language awareness. The data indicated that the teacher was also aware of his EBL students' struggles with the English language. However, since the level of language development and literacy skills varied with each student, it was difficult for him to develop lessons that took into consideration his students' varying language skills. He used student participants' artifacts such as grades, tests, quizzes, and assignments to show the students' struggles with sentence structure and how he continuously provided sentence stems to guide them in their writing. The artifacts also showed that the female participants completed all their homework and classroom assignments, whereas the males did not. According to the teacher, "the girls usually always turn in their homework and get their work done, but the boys I always have trouble with." The male participants' classroom artifacts also displayed more grammatical errors, spelling errors and incorrect sentence structure than did the females'. The teacher also indicated that the female participants were more organized and put more effort in their work than did their male counterparts. He added that each of the participants displayed "better English speaking skills than writing skills" and that knowing his EBL students' struggles with the language, he allowed responses to be written in Arabic in some of the assignments, even though he was unable to read Arabic. He justified such approach by commenting that "it's better to receive some effort rather than nothing at all."

The teacher further explained that although he was aware of his EBL students' struggles with the English language, he sometimes experienced difficulty identifying approaches that specifically targeted their needs. He stated,

> I know that my EBL students have problems with expressing themselves on written work. I understand that they have trouble with the language. I give them comments like I do my other students, but sometimes it seems as if the comments do not help, because they continue to do the assignments incorrectly.

He also expressed concerns with his EBL students' lack of motivation due to their language barriers. He said, "It's hard to get students motivated when they don't understand. So if I fail to create engaging lesson plans, I lose my students' attention." He acknowledged that not every lesson can be "fun" but lessons should engage the students' curiosity with the material presented.

Cultural awareness. Data from the classroom observation and interviews indicate that the teacher made significant efforts to understand and respect his EBL students' cultural norms, while acknowledging some limitations. For instance, during his interview, he stated:

> Of course, there are some things I am not familiar with. I am not an expert on their culture, but I do try to figure things out especially if it's affecting their school work. And when you have 30 students in a classroom, I mean every hour for 5 hours a day from all different backgrounds, it's hard to get to know them all. I do what I can.

He then went on to describe an incident that occurred with Fatima:

> Fatima covers her entire face, sometimes once in a while she lets only her eyes show. But that's it. You know my bilingual students especially the girls don't ask questions or even ask for help. So sometimes you can tell by looking at a student's face whether s/he is confused or not. Well it's hard to do that when Fatima covers her entire face. And I completely understand that it is her religion and I respect that. But she was always confused in class and we (teachers) couldn't see that. I did talk to her social studies bilingual teacher about it because she was an Arabic Muslim female, who also wore the scarf. I figured she had a better understanding of the situation than I did. She said that she was having the same problem with Fatima. She offered to call her father but I didn't want to call the father and say "hey can your daughter not cover her face?" (laughs) that's kind of awkward. So I just told her she could do the honors and call.

The female bilingual teacher spoke with Fatima's father regarding removing the niqab (face veil) in order for her teachers to better scaffold her learning. The teacher stated that such interactions

with Fatima's family had been professional and respectful so as to not place too much focus on the issue, while acknowledging cultural sensitivity. Fatima's father at first opposed the idea, but then agreed to allow Fatima to remove the niqab only during school hours. He still insisted on her wearing the niqab outside the school. The teacher added:

> We (Fatima's teachers) were all glad that her father approved. We figured that now we can better assist her, and she was happy about it too. Well, Fatima has a brother in a couple of her classes, and when he found out that she was not covering her face anymore, he flipped. He ended up going to the social studies teacher, because she was the one who called dad, and said, "why would you let my sister take it off? That is not right, it's our religion. Even if my dad approves, I don't approve! I'm her brother and the man of the house, I watch over her."

The teacher concluded, "I mean, I thought we only had to deal with the father, but the brothers are much worse to deal with. Overall, it was a learning experience for me."

During the interview, the teacher was also asked about his EBL students' parental involvement, particularly as it related to the female participants. The teacher responded,

> Parental involvement with my Arabic female students does not exist. Their parents really do not seem to care about their education or how they do in school. However, they do care about their behaviors, like whether they talked to boys in class. During parent-teacher conferences, the dads won't even ask me about their grades, they would just say "she's not talking to any boys, is she?" or "she doesn't have any relationships, right?" That's really all they care about. When I first started working here, I used to ask other teachers, whether that was normal.

The teacher further stated that he frequently tried to convey to families after school programs such as tutoring and mentoring to assist with their children's school work. However, Arab parents only permitted their male children to participate in such programs, as they believed after school activities would provide their daughters with opportunities to socialize with male students. It appears that such worries on the part of the parents were not unfunded as illustrated in the following excerpt from the interview with the teacher. As he pointed out,

> I mean, I do see why they (Arab families) always shut me down when I tell them about after school tutoring. A lot of the Arabic girls lie to their parents about staying after school so that they can hang out with their friends, because they know when they go

> home they are not allowed to leave. I had one female student who one time come to me after school and said, "can you please call my dad and let him know I am with you to make up a test?" Of course, I refused. But this happens often. I remember when I recommended to one of the Arab dad's about tutoring after school for his daughter, he said, "no way I know what happens after school, girlfriend, boyfriend…No no no" (said the teacher trying to imitate an Arabic accent).

The teacher added in defense of the female students: "Well, I think they (Arab female students) only lie and engage in such devious behavior because their home culture and rules forbid them from socializing and gathering with friends." The teacher was aware that such cultural and family restrictions did not apply to his Arab male students, who had the freedom to participate in after-school tutoring, and to communicate with other male peers. The teacher concluded that his awareness and understanding of his EBL students' cultural norms had improved through the years, which in turn increased his ability to better assist them.

Strategies used to facilitate language acquisition and cultural integration. Classroom observations indicate that the teacher used a variety of strategies to help remediate his EBL students' sociolinguistic challenges, while facilitating language acquisition and cultural integration in the science classroom. The strategies he used included but were not limited to: 1) utilizing technology to facilitate instruction, 2) using inquiry-based activities and collaboration, 3) scaffolding instruction and making accommodations, and 4) incorporating cultural discussions to promote multicultural education.

Utilizing technology. The teacher considered student interest in terms of their exposure to technology by integrating technology in classroom activities that facilitated active learning and language development. Throughout several classroom observations the teacher incorporated some form of technology, such as computer software, simulations, online labs, simple machines, computer-based laboratories and experimental equipment, to help his students learn important scientific concepts and develop language skills. Specific activities that involved technology

included a population biology simulation, a DNA extraction virtual lab, an illuminating photosynthesis activity, and a virtual pond dip activity. Despite the EBL students limited technical experience, these interactive activities still allowed them to build on their language and digital literacy skills. For instance, although Fatima and Ahmed were often seen randomly clicking buttons when working on the computer, they were still forced to have meaningful interactions with content and had to interact with other students in order to complete the tasks. In one particular classroom observation, the students practiced their "cells and viruses" test using an e-learning site known as Ilearn Moodle Courseware. The assessment incorporated animated illustrations with various questions that the students were required to answer. During the interview the teacher elaborated on the usefulness of Ilearn:

> I love using Ilearn especially as a way to engage students. Most of my tests and quizzes are on Ilearn, I create them on the Ilearn site the way I want. Usually I do multiple choice questions and a few short answer or fill in the blank questions, mainly to help my bilingual kids. What's nice about it is that you can add moving animations and visuals, and ask questions about them. This really helps the bilingual kids because of their low language skills.

The teacher further mentioned that several of his newly immigrant EBL students had never been exposed to technology due to their low socioeconomic status in their country of origin. He indicated that technology embedded lessons, allowed his EBL students to construct representations of their knowledge associated with both technological and scientific discourse while facilitating language learning. According to him the benefits of technology in instruction are many including: 1) engaging students on the task at hand; 2) increasing student interest and motivation; 3) making the topic more meaningful to learn; 4) facilitating negotiation and discussions; and 5) promoting positive attitude towards learning.

Inquiry-based activities and collaboration. The teacher used inquiry-based instruction involving real life, culturally relevant problems, to which his EBL students were able to relate.

Some of the scientific problems included issues associated with the Middle East, in which he created prompts that reflected his EBL students' backgrounds such as: natural resources and Middle Eastern oil; the Arab world's water supply, conservation, and desalination; and fossil fuels and the environment of Arab countries. The teacher also developed a writing prompt in which students were required to read the prompt and write a response on, *why does water move through a paper towel?* In the prompt scenario, characters were purposely named Moe, Ahmed, or Haider, to show recognition of cultural awareness. The teacher implemented several inquiry-based labs/activities in his biology class throughout the duration of this study, such as: osmosis and diffusion in an egg; homeostasis of the eye; extracting DNA from cells; human hand adaptations; food web lab; bacterial habitats; invertebrate project; and chromatography of plant pigments. While employing the aforementioned activities/labs, the teacher used a modeling approach during which he displayed for his students accurate ways of conducting the activity, reporting results, drawing conclusions, and applying analytical reasoning. The modeling strategy appeared most effective with EBL students as it illustrated the task at hand through visual and auditory representation. During such inquiry activities, the teacher enforced student collaboration as a way to enhance language development. According to the teacher:

> My students for the most part like working in groups. Plus when they are in groups, those students who may have a limited understanding of the task at hand can get help from other members of the group. I try to use a lot of teaching strategies that allow for student conversations like turn and tell, or think pair share, or jigsaw.

Data from classroom observations indicate that these types of activities were successful in engaging the study's participants in the learning process and that the more engaged they were in the activity the less distracted they appeared. The teacher stated that he purposely incorporated collaboration and group work frequently in his classes to increase social interaction and cultural integration among students. He pointed out that engaging his EBL students in meaningful and

relevant academic tasks led to increased language development, motivation, comprehension, and scientific literacy. He added, "you obviously just can't put them in a group and tell them to go; they have to be engaged in a meaningful task. Students do learn more when they are teaching someone else." He then explained that social mediated learning allowed his EBL students to develop their English language skills naturally and discover the basic understanding of science:

> I think by incorporating both science inquiry activities and having students collaborate during those activities, really helps my students become engaged and more interested in science. Plus this is really important for the bilingual kids especially because they have to learn the language as well.

He went on to say that science inquiry and collaboration provided ideal opportunities for second-language learners to hear and practice English beyond social language. During his interview Ahmed commented on why he favored group work:

> The teachers have to give us time for us to work, because if they talk, talk, talk all the time, then we won't talk. And when they talk for a long time it just makes me sleep because it is so boring. I mean I'm too scared to talk in front of the class but I do a little bit in a group. At least I don't sleep (laughs).

The teacher also greeted his students at the door and welcomed students as they entered the classroom as a way of increasing communication on a personal level. However, cross-gender communication was difficult to implement because the classroom segregated itself along gender lines and cultural norms that prevented the Arabic female students from interacting with their male peers.

Scaffolding instruction and accommodations. The teacher also facilitated language acquisition and cultural integration in his classroom by scaffolding instruction and developing individualized accommodations for his EBL students. Strategies that the teacher used to scaffold instruction and develop scientific literacy skills included: using interactive science notebooks; applying content-area reading skills to decode and comprehend nonfiction text; teaching to read charts, graphs and diagrams; using visual/verbal literacy to help establish meaning; and

providing access to relevant information through different forms of resources and technology. During the interview, the teacher elaborated on his use of interactive science notebooks by stating:

> The students love their interactive science notebooks, and to be honest with you, so do I. Their science notebooks help them stay focused throughout each particular unit, especially since I have to cover a vast amount of material that sometimes becomes an overload on these kids. The notebook honestly allows them to do better on their tests and quizzes because their notebook is their "one stop shop." Everything they need to know for a specific unit is in there.

He further explained that students created their own personalized interactive science notebooks in which they displayed their picture and other possible ownership information they were willing to share, such as their favorite hobbies, food, and interests. According to the teacher, the purpose of the interactive notebooks was mainly to locate one designated area in which students were able to take individualized notes, convey thoughts, collect data, gather information, and record teacher's notes. This was particularly helpful to his EBL students, as they ultimately required this form of scaffolding to help them categorize and attain knowledge. As the teacher pointed out, "the interactive notebook, not only encourages student creativity, but vitally functions to keep students organized."

With student's constant display of confusion and lack of connection to the content, the teacher was constantly forced to scaffold instruction based on students' feedback and reactions. The teacher used SIOP (Sheltered Instruction Observation Protocol) strategies to increase academic performance of his EBL students. For example, the teacher clearly defined both the content and language objectives and adapted content to all levels of his students. Students were required to write both their content and language objectives daily in their interactive science notebooks, once they were done writing, he went over the objectives with the entire class. With his lower English proficiency students, such as Fatima and Ahmed, he provided them with the

weekly objectives in the beginning of every week. However, the objectives sheet was constructed like a graphic organizer, which contained missing terms and thus required them to follow along and fill in the blanks to ensure that they remained focused and on task.

During the genetics unit in which the students were learning about the structure of the double helix, the teacher developed an assignment for his lower level English proficiency students, including Fatima and Ahmed, which consisted of organizing the double helix using the four base pairs and corresponding colors to help scaffold instruction. During the lesson, Fatima and Ahmed were learning both the different colors presented and the four base pairs. Whereas, Mariam and Ali did not have the color lesson component, and were required to form the double helix model based on the science knowledge used to describe the structure of DNA. In another observation, the teacher had given Fatima and Ahmed an assignment that consisted of 3 to 4 word science concept sentences, in which they had to write the exact same sentence on a provided line below. Fatima was consistent with remaining on the line, however Ahmed randomly drifted away from the line. In another instance, when the teacher provided a reading article on the different components of a habitat, he created three different levels of the same article in which he labeled on the top of the front page: 1, 2, or 3, where number 1 represents the lowest and 3 the highest reading level of his students. Fatima and Ahmed received the lowest reading level article in which the content was chunked, whereas Mariam and Ahmed received level two article which consisted of lengthier material and concepts. Behind the level 1 article only, the teacher stapled the Arabic text of the article using each student's particular dialect, which was the Yemeni dialect in the case of the participants. When asked during the interview how he was able to obtain the Arabic translation of the articles, he responded that Microsoft word contained a translation feature with different languages and specific dialects. He also mentioned that he allowed his level 1 students to refer to the Arabic text only when they were

completely stuck. After reading the articles, the teacher implemented QAR (question, answer, relationships) strategy in which he asked questions and required students to find a relationships based on how the questions were categorized. There are four types of QAR questions: 1) right there, 2) author and me, 3) think and search, and 4) on my own. Once the students have answered their question, they must identify the type of question based on the four types. All participants in this study struggled with identifying the types of questions that the teacher asked based on the QAR model. Sentence starters were provided for Fatima and Ahmed to help guide them through the answering process. Prior to passing out the articles to students, the teacher often pre-taught key words from the article that he knew his students would struggle with and he often did that through an interactive word game. For example, in one of the interactive word games, he required all his students to write each definition of the key words on note cards, and then he selected two students, placed two note-cards word side up on a table with each student standing on either side of the table. He then recited the definition, and the first student that grabbed the correct term of that definition on the table would obtain the card. The student with the most cards won. Students were in groups of three and rotated members so that all would have a chance to play.

Another instructional scaffolding strategy the teacher used with the EBL students was marginal notes and leveled study guides. The leveled study guides were composed of different questioning strategies ranging from easiest to most challenging in which the teacher designated different markings to represent difficulty levels. In regards to marginal notes, the teacher made copies of certain sections from the student's biology textbook and highlighted and included teachers notes of important ideas, key concepts, or vocabulary. Sometimes, he required the more advanced students to do their own side notes and highlighting. He referred to this type of strategy as "annotating" or "talking to the text," which too from the Readers Apprenticeship (RA)

ongoing professional development that he attended. Other RA strategy the teacher used included an anticipation guide in which students were required to make connections and share their prior knowledge of the topic prior to reading. For his level 1 students, such as Fatima and Ahmed, he allowed writing in Arabic or drawing pictures to illustrate their thoughts on the anticipation guide. In response to the school's priority status, the entire school had also implemented a specific time for reading independently which was referred to as SSR (sustained silent reading) time. During SSR time which was set daily from 10:20 am to 10:40 am, all students and teachers were required to read for 20 minutes anything they liked. During that time the teacher in this study gave his lower level English proficiency students elementary school children's picture books which included Spongebob or Dora. For students like Mariam or Ali, he gave them easy-read chapter books; they particularly enjoyed reading the Bluford Series books.

The teacher also used a content word wall in the classroom, where he would revisit the key vocabulary of that particular unit frequently during his lessons. He would reduce the number of words on the word wall on a regular basis in order to display a reasonable number. For instance, during his genetics unit, his word wall consisted of the following terms: genetics, alleles, frequency, phenotype, genotype, Punnett square, meiosis, mitosis and chromosomes. As another scaffolding strategy he required all of his EBL students to have a personal dictionary created for every unit. The teacher would meet with individual students to discuss some of the terms and provide feedback where needed. The students were required to include in their dictionaries any unknown terms they had come across through reading texts or teacher's notes. Fatima and Ahmed had more words in the personal dictionaries than Mariam and Ali.

During one of the classroom observations, the teacher instructed his students to turn in their homework assignment and to begin working on their daily assigned bell work. Immediately, he recognized a confused look that surfaced on some of his students' faces. While

mentioning the word "homework" he held up the homework assignment to present a visual cue to the students to enable language learning. The students acknowledged this and turned in their homework. The teacher then began the lesson by saying, "Alright class, I want you to look at this graph of exponential growth of a population, and tell me what it means." The students, particularly his EBL students, were oblivious to how to read the graph. Once the teacher became aware of their confusion, he incorporated additional resources to further scaffold instruction on reading graphs and charts. For example, he gave those students with limited understanding, including the participants, a guide to reading charts, graphs, and tables. He then created a small group practice session towards the back of his classroom in which he facilitated instruction for those struggling with the task. Scaffolding oral skills such as listening and speaking became the target of the lesson on a daily basis despite the subject of the course being science. Later during the interview, the teacher explained that in the classroom he continuously had two objectives or challenges he must achieve: 1) "conveying information while facing the bilingual students' language barrier," and 2) "educating the students on various science disciplines."

Multicultural education. To promote cultural integration and multicultural education in the classroom the teacher developed class discussions and arranged frequent opportunities in the curriculum for his EBL students to participate in cultural awareness and language acquisition. For example, the teacher frequently created a learning environment that developed congruence between the nature of science and student's cultural background and experiences, particularly during his *Evolution* unit. Such learning environments included: class discussions on how different cultures viewed the concept of evolution; identifying students own personal outlook on evolution; students making inferences rather than memorizing facts; and engaging students in problem solving without following the scientific method. Other instructional resources used during the *Evolution and Genetics* unit included: historical science episodes of common human

mutations; an activity on how new species evolve; and a case study on sickle cell anemia. During the interview, the teacher described difficulties he encountered when teaching about the concept of evolution, particularly with students from diverse religious backgrounds:

> I know when I teach my evolution unit, I have to be very culturally sensitive. Because every time I teach about evolution, I have some students say, "it's not real, I don't believe in that," or "I'm Muslim, that goes against my religion," or "I believe in Adam and Eve." Of course, I have to respect their comments and beliefs.

The teacher explained that the diverse cultural background of his students created opportunities for discourse within science learning, and recognized the need to develop science instruction that articulated his students' experiences with science knowledge while promoting their cultural background:

> Science is not easy for kids to understand. Students can't just passively learn science; they actually have to be doing science that they can relate to. Not everything can be related to their experiences or culture, like evolution or cloning or plate tectonics. They just believe it's God's doing. But I try to do what I can.

According to the teacher, he tried to use diversity, not as a barrier to learning science, but as a resource to achieving scientific concepts, which involved understanding EBL students' sense making and ways of knowing. Such awareness of cultural diversity was important to the EBL students. As Ahmed pointed out during the interview,

> Science is much harder than the rest of my classes because I have to first think about the language and then the hard science words. I think that math is easier because it's numbers. And science is so boring, sometimes I like it when we do stuff I can understand.

The teacher also tried to access students' prior knowledge about how the world works and develop student interaction where discourses of language, literacy, and science concepts were discussed. According to the teacher, he implemented this through multiple strategies such as:

> Classroom discussions, collaborative activities, modeling, caring, role playing, making personal connections and by simply paying attention to students' responses, these strategies give me an opportunity to get to know the kids better. And I really need to, considering the diverse makeup of my classroom.

He further indicated that his EBL student's funds of knowledge can be established by engaging them in the topic and identifying their prior knowledge of the topic based on experiences of their skills, social relationships, and cultural values. To identify his EBL students' funds of knowledge, the teacher during one of the classroom observations began the genetics unit by handing a blank paper with the title "genetics" to his students. He then said to the class:

> Today we will begin our next unit on genetics. On this paper titled genetics, write down anything that comes to mind about genetics. You need to write at least 10 things that you know about genetics. Could be an example, experience, thought, or personal opinion regarding the concept of genetics.

CHAPTER 5 DISCUSSION, CONCLUSION AND IMPLICATIONS

This chapter provides a discussion of the results presented in the previous chapter and their implications. The discussion that follows is organized around the three research questions that frame the study.

Challenges of Arab EBL Students and its Effects on Academic Achievement

The results of this study indicate that the participants (four Arab EBL students) encountered numerous challenges in the science classroom. The data from classroom observations and interviews showed that such challenges included social, cultural, and language barriers, which negatively affected the participants' academic achievement. According to Gass and Selinker (2001), learning a second language entails the comprehension and understanding of the sociocultural semantic field surrounding that language. In addition to struggling with language development, science learning was difficult because it required the participants to construct meaning and develop relationships among concepts which were affected and influenced by their linguistic, social, and cultural experiences (Lee, 2010; Fradd & Lee, 1999). When crossing geographical borders, the participants did not anticipate the emotional and behavioral boundaries they confronted. Indeed, the language was one of the most difficult problems the participants encountered. Their new cultural context not only involved linguistics, but a social component influenced by the gender-specific roles of the Arab culture to which they belonged.

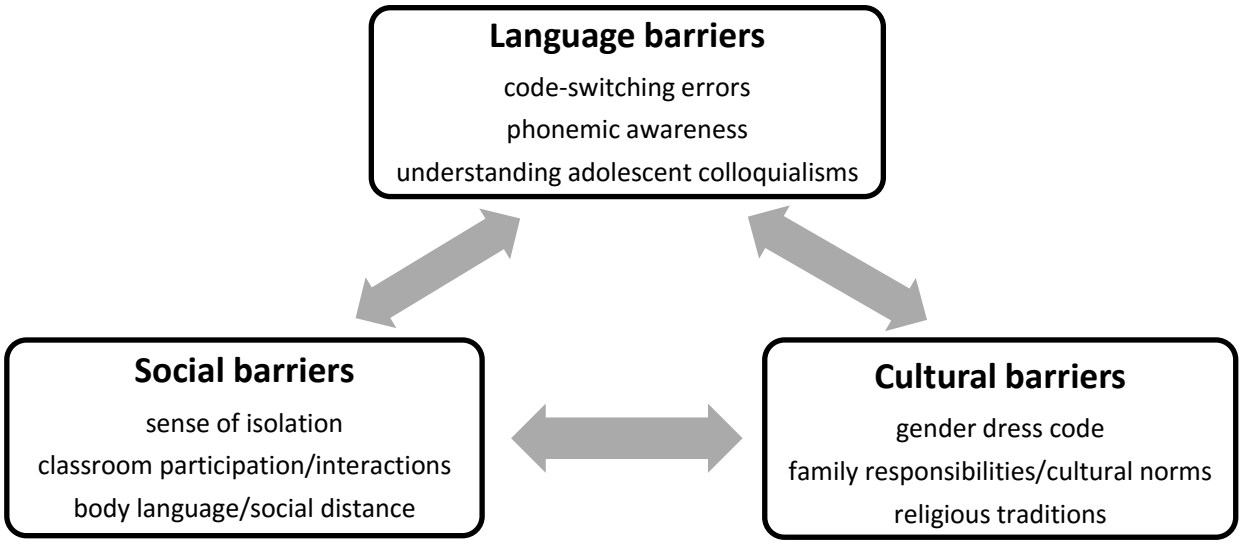

Figure 1. The challenges Arab EBL students encountered

The data also indicates that the issues and challenges they encountered were interrelated, as shown in Figure 1. For example, the participants' language struggles related to code switching, phonemic awareness, and adolescent colloquialisms, affected their social and classroom interactions and were influenced to some extent by their culture and religious traditions. Moran (2001) pointed out that a clear bond exists between language and culture and that language is a window into culture. The participants' strict cultural norms, particularly in the way they dressed, behaved, and practiced religious traditions, limited their interactions in the classroom. Such cultural differences widened the social gap between the participants and their non-EBL peers and compounded the likelihood of misunderstandings, further reducing interactions among them. Their lack of interaction with others from a different culture in turn decreased their opportunity to use the English language, thereby hindering their acquisition of the second language and academic achievement. Such challenges potentially caused the student participants to become disengaged, discouraged, frustrated and unmotivated. As stated in the literature (see Harklau, 1994; Duff, 2001; Salazar, 2010), neglecting to recognize the students'

cultural backgrounds might result in low confidence and self-esteem, which negatively impact EBL students' academic performance and experiences (Harklau, 1994; Duff, 2001). Educators will not be able to effectively instruct EBL students unless they are aware of their cultural backgrounds and native language (Salazar, 2010).

Linguistic challenges. The findings indicate that all four participants struggled with the English language, which resulted in anxiety when attempting to communicate and interact with others in the classroom. As one of them pointed out, "I get so scared to talk in front of the class, I get nervous and sweaty. If I know the language I would not be that nervous and scared." The participants mentioned that Arabic was used at home, with friends, and during interactions with other individuals in the community. Since they only used the English language at school, they often experienced interference of their first language when trying to speak English. When the participants had to speak, read, or write in English, they thought about the concepts in their native language first, and then transposed the ideas into the English language. Such transfer from their native language into the English language resulted in code-switching errors (Grami & Alzughaibi, 2012). Due to these code-switching errors, the participants had difficulty speaking and writing in English and doing so required excessive time when working in classroom activities and assignments. The participants' Arabic to English translation resulted in linguistic code-switching interference of their native language, as the Arabic language possesses different grammatical guidelines in terms of verb tense rules, syntactic structures, verb usage, and possessive pronoun/noun sequence. They frequently had to think of appropriate ways to speak and write their ideas, particularly since all adjectives and nouns in the Arabic language designated gender in reference to animate and inanimate objects. Due to such linguistic differences, the participants required longer response wait-time from their teacher, which could

decrease code-switching interference of L1 and reduce anxiety when speaking in front of an audience.

The findings also suggest that the participants were often not able to recognize informal language used in casual conversations or colloquialisms influenced by particular social groups. This lack of understanding affected their sociolinguistic interactions with others and impeded their application of the English language in different contexts. However, the amount of time in the US played a role in the participants' level of mastery of various aspects of the English language. Findings indicate that Mariam and Ali, who had been in the US for a longer period of time, appeared to understand many of the colloquialisms used by their non-EBL peers.

The participants also displayed difficulties distinguishing academic language from conversational language. Conversational language, also referred to as informal language, appeared frequently in their writing as they were unable to accentuate the differences between the two. Unfortunately, such linguistic struggles caused the participants to become frustrated. As Fatima pointed out, "my language problem tatheer (affects) my grades. Because of the language, I don't want to go to school and I don't want to learn." These findings support the findings of other studies on second language acquisition and participants' difficulties distinguishing between academic and conversational language (Cummins, 1992). Cummins (1992) made the important distinction between "conversational" and "academic" language. In order for the participants to acquire and master the English language, they needed to engage in ordinary means of communication such as speaking during assignments and interactive activities that required them to differentiate between conversational and academic language.

According to Chomsky (2002), since all languages are represented by a set of sentences and phenomes, all languages and language learning can be understood by examining the characteristics of a sentence. However, it was challenging for the participants to examine the

characteristics of a sentence when they lacked phonemic awareness and the ability to recognize letter sounds and diagraphs. Since the Arabic language is written from right to left and lacks silent letters, upper case letters, vowels, and distinct letter sounds such as “th” or “p” or “v” the participants struggled with the sequencing of words when creating simple sentences in English. Even though, the classroom demonstrated a rich literacy environment, the participants’ lack of phonological knowledge of the English language resulted in poor reading skills and low processing speed.

Social challenges. Swain, Kinnear, and Steinman (2010) stated that the current “Sociocultural theory emphasizes Vygotsky’s insistent focus on the relationships between the individual’s psychological aspects and the social and culturally produced contexts and artifacts that transform the individual’s cognitive and mental functions” (p. 18). Vygotsky’s argument that knowledge is constructed through collaboration with other learners and environmental factors is an important aspect of all sociocultural theories. Learning also takes place at the unconscious level and requires individuals to put into practice what they have acquired (Krashen, 2003). The results of this study indicate that the participants encountered difficulties adapting to their new environment, which influenced their communication and social interactions with others. The participants’ difficulties with the English language and distinct culture reduced their classroom participation and interactions with others, and led to a sense of isolation. Furthermore, gender played an important role particularly in terms of the social distance that their culture mandated between themselves and others, particularly males.

According to Krashen (1987) and Shaffer (2008), language abilities come from a social aspect of the individual’s environment and cultural surroundings. Krashen (1987) explained that one of the most crucial methods for language acquisition involves learning through observation and communication. Social learning involves observing a model, which could potentially be the

participants' classmates and imitating the behavior that occurs. However, the participants' attachment to one another and isolation from their peers drastically impacted their social learning and participation in classroom discourse. Since they did not attempt to reach out to their peers and socialize, they reduced their chances of learning English and develop competency in the American culture.

Cultural challenges. Often a second culture contains a unique set of cultural assumptions and behavioral norms different from one's own (Lantolf & Thorne, 2007; Mitchell & Myles, 2004; VanPatten & Lee, 1990). Findings from this study support those of other studies suggesting that Yemeni students experience unique difficulties adapting to new cultural norms and behaviors that are distinctly different from those of their culture (Peregoy & Boyle, 1993; Ho, 2007). However, one must also take into consideration the diversity that exists within the Arab culture, often the result of geography, which is reflected in the cultural norms practiced in those areas. For instance, all Arab countries possess different cultural values and norms that dominate their society particularly regarding women rights and freedoms (Alkrenawi & Graham, 2003). For example, the Muslim females of Lebanese origin dressed less conservatively than Mariam and Fatima, including wearing pants with head scarves. On the other hand, the Yemeni population, to which the participants belonged, adheres to stricter cultural norms than other Arabic cultures such as those of Lebanon or Syria. Furthermore, the participants' Arabic culture was mediated by their strict Islamic religious practices. Therefore, one cannot speak of the Arabic culture without acknowledging the role that Islam plays, as the core foundation of the culture. For example, the strict dress code, extraneous family responsibilities due to polygamous marriages, religious practices such as daily prayers and Ramadan, and the separation of the sexes are practices rooted in Islamic religious beliefs. As a result, the participants of this study, regardless of the time in the US, continued to adhere to their traditional Arab culture and Islamic

beliefs because such norms and beliefs were closely monitored and enforced by their families and community.

As stated in the literature (see Labov, 2010; Lantolf & Thorne, 2007; Mitchell & Myles, 2004; Vygotsky, 1978; Zimmerman, 2003), from an educational stance, sociocultural theory recognizes the importance of understanding cultural beliefs and norms of different populations. It also postulates that students' early language learning is enhanced when meaning is created in a collaborative setting with other members of a given culture (Mitchell & Myles, 2004; Zimmerman, 2003). Similarly, Vygotsky (1979) asserted that learning occurs through an individual's interactions with others and the surrounding environment taken place within a cultural context. However, sociocultural theory does not take into consideration gender-specific cultural norms such as those experienced by the participants in this study. In this study the strict gender specific roles of the Yemeni culture had greater impact on the participants' learning development than the amount of time they had been in the US. The strict gender-based norms that the female participants had to abide by stood in the way of developing any form of friendship, except with other females from similar Arabic cultural backgrounds. Even friendships with female students from less traditional Arabic cultures such as those from Lebanon, who did not wear the traditional Islamic clothing, were frowned upon. As a result, Mariam and Fatima usually kept to themselves in the classroom and when given the choice to work collaboratively they tended to seek each other's company, thereby decreasing their opportunities to practice the English language and to interact with students from a culture different from their own. Such cultural displacement faced by this group of Yemeni students resulted in frustration and academic failure (Duff, 2001). According to Luo (2014), cultural isolation, which may include segregation based on race, ethnicity, culture, and language leads to higher risks of social-emotional and behavioral problems. The participants' cultural isolation led to misunderstandings

between different cultural groups and negatively impacted their language development, and interfered with their success and academic growth. These findings support those of Rogoff (2003) and Nieto (1992) in that minority students' interests and motivation are decreased when learning takes place in contexts outside their cultural values.

Extraneous family responsibilities, as a result of polygynous marriages, also impacted the participants' academic achievement. According to Alkrenawi and Graham (2003), the practice of polygyny, allowing a man to have more than one wife, is relatively common in the more traditional Arabic cultures. For instance, three out of the four participants in this study had fathers who had polygynous marriages. Such marital practices in turn increased family responsibilities and household duties for the participants due to the large number of members of the household and related expenses. The work demands of such a home environment affected the participants' success in school, since much of their time at home was spent attending to family responsibilities.

Another cultural factor, which influenced the participants' educational experience, were mandatory religious practices such as fasting during the holy month of Ramadan and the consumption of specific foods especially meats referred to as "halal." As pointed out in the social-cultural theory, EBL students are influenced by their native culture's norms, practices, and values (Gibbons, 2003), and they are a product of a culture that may entail different expectations of how students behave in educational settings (Roessingh & Kover, 2002; Aikenhead, 1997). The participants' cultural demands related to the consumption of only halal meats, praying five times a day, and fasting during the month of Ramadan exacerbated their struggle to acclimate to the American culture. Because of such religious practices, the participants felt that they did not belong, particularly given that such practices were often the source of ridicule from their non-Muslim peers. In addition, the participants' engagement, particularly Ahmed and Ali, in daily

prayers during school hours caused them to miss valuable instructional time. The mandatory month-long fasting of Ramadan also resulted in the participants' inability to concentrate in school-related tasks due to hunger and low energy levels.

Participants' Perception of their Social and Cultural Identity

Cultural identity has been described in three ways: (1) where individuals belong and to what group, (2) how they perceive themselves, and (3) how they maintain their beliefs, norms, and values (Nieto, 1996; Norton, 1997; Seller, 1992; Walsh, 1990). As stated in the literature, cultural identity is based on individuals' perception of their ethnic identity and is shaped by their experiences in society (Bourdieu & Passeron, 1977; Cohen, 1981; Espiritu, 1993). Vygotsky's social development theory also states that the development of one's personality depends on one's upbringing and teaching; identifying most with the values and norms of the culture to which one belongs (Davydov, 1995).

Three of the four participants in this study identified themselves first and foremost as being Arab. The male participants in particular were proud of their Arab identify and strongly defended their Arabic cultural norms. On the other hand, the female participants appeared to be more open to the American culture and one of them, Mariam, who had been in the US for a longer period of time, appeared to have begun her transition to an Arab-American identity. As a result, at least for the females, the findings of this study support the assertion that the individual's length of exposure to the new culture is related to his/her level of acculturation (Berry, 1989). The females' greater attraction to the American culture might have been a result of the strict gender-specific roles and restrictions that they experienced in their native culture. Such attraction to the American culture was also highlighted in Sarroub's (2005) study in which she examined Yemini girls sense of identities as "Yemenis, Muslims, Americans, daughters of immigrants, teenagers, and high school students" (p. 5). The strict gender-related norms imposed by their

culture, and enforced by their families and communities, led to anxiety and frustration, as such norms conflicted with those they experienced in school. According to Roessingh and Kover (2002), every social structure creates its own norms, and thus requires new behavioral cooperation and expectations. The conflict that the female participants were experiencing between their Arabic and American culture was beginning to challenge their beliefs about their native culture. For instance, they began to question the lack of appreciation in their Arabic culture for female education. As pointed out by Alkazraji (1996), educated Muslim immigrants have a greater acceptance of the American culture than non-educated Muslim immigrants. Perhaps this knowledge was at the root of their family's fear about the education of their daughters.

Although duration of time in the US seemed to have an impact on the identity of the female participants, it did not appear to have such impact on the males. Unlike the females, the male participants enjoyed and appreciated the freedom connected to the masculine identity that their Arabic culture and Muslim religion afforded them. They felt responsible for defending and protecting the female members of their family and such beliefs helped shape their masculine identity as strong male authoritarians. However, despite their sense of self as Arab males, they resented their non-EBL peers' stereotyping and lack of understanding and acceptance of their culture, which in turn was a constant reminder that they did not belong, and contributed to a negative attitude towards the mainstream culture (Tajfel, 1981). Smith (1997) found that the negative feelings developed as a result of discrimination further help construct one's cultural identity. According to Gee's (1999) when students have a positive perception of themselves, they learn to value their linguistic and cultural backgrounds and develop their identities as science learners. This development of positive perception among the participants may have been difficult to achieve, given their negative experiences at school. They felt the school environment

hindered their learning process because the school did not make efforts to educate others about their unique cultural background. They believed that, had their non-EBL peers shown greater awareness about their cultural background they would have encountered less exclusion and bullying. According to Davydov (1995), when students cultural background is not recognized and accepted, their self-worth and existence as individuals is negatively impacted, which affects their identity development.

According to Moran (2001), language is used in culture to name and understand the perceptions, attitudes, values and beliefs that oversee one's way of life. However, language also functions as a critical element in the process of identity development (Bourdieu, 1991; Gee, 1999). The participants in this study experienced challenges from a cultural standpoint that influenced their social identity, which in turn limited their opportunity to use the English language, thus impacting their linguistic development. Their struggles with the English language limited their interactions with their teachers and peers, thereby further limiting their language development. Such social interactions are critical in helping them develop an identity as Arab-Americans and a sense of belonging in their newly adopted country.

Participants' Perceptions of their Educational Experiences in the US

EBL students often have a history and culture that are distinctly different from those of the dominant culture (Grant & Wong, 1994). In this study, these differences mediated the participants' perceptions of the US education system they were experiencing. The participants' perception of the US educational system as one of the "best" and "strongest" in the world, had been developed in their home country and before immigrating to the US. These findings support the research on international students who come to the US for post-secondary education (National Association for Foreign Student Affairs - NAFSA, 2007). Such research indicates that many countries believe the education in the United States is one of the best in the world

(Altbach, Gumport, & Johnstone, 2001). A study by Constantine (2005) found that immigrant and international students believe that the United States offers high quality education with many academic opportunities. The participants in this study shared similar beliefs and were glad to find out that the US educational system did not use corporal punishment. Yet, their educational experiences in Yemen continued to mediate their behavior in the US classrooms. They had been taught that speaking up to offer one's personal opinion or to make eye contact with the teacher were signs of disrespect, worth of corporal punishment. As a result, they had difficulty volunteering to answer questions and make eye contact with their teachers.

According to Levine and Havighurst (1997), student's classroom behavior and attitudes are indicators of their academic performance. EBL students who have a negative perception of their education, due to negative experiences, may possibly lack self-esteem and confidence to succeed in the future. Because the participants experienced classroom challenges, they developed a mental model of themselves as unsuccessful, which further decreased their confidence and affected their academic achievement. The participants in this study also had difficulties understanding the grading system used in the US, resulting in misunderstandings of their teacher's feedback.

Teacher's Awareness of Arab EBL Students' Sociolinguistic Challenges

The results of this study indicate that the participating teacher was aware, to a great extent, of the unique challenges that his Arab EBL students faced, linguistically, socially, and culturally. However, although he used teaching practices (e.g., technology; group activities; reading and writing) that helped facilitate student interaction and language development, he had not been successful in helping his students bridge the cultural gap that existed among them. The teacher could have used the following approaches to help develop cultural understanding and appreciation among his students: 1) demonstrating caring strategies (Mitchell & Myles, 2004;

McCroskey, 2009); 2) employing humanizing pedagogy (Salazer, 2010); 3) implementing activities that target student's "funds of knowledge" (Moll & Amanti, 2001); and 4) incorporating cultural learning (Moran, 2010) and the instructional congruence model (Lee & Fradd, 1998). The benefits related to these pedagogical approaches are discussed in section below.

Research suggests that teachers' who possess higher levels of awareness of their EBL students' backgrounds are more likely to demonstrate acts of caring in the classroom (McCroskey, 2009; Mitchell & Myles, 2004; Salazar, 2010). When students recognize that a teacher cares about them, they are more likely to care about the class, and more likely to care about the content, thereby more likely to pay attention in class (McCroskey, 2009; Mitchell & Myles, 2004; Salazar, 2010). Although it was clear this teacher cared about his students, it was not clear that the participants of this study viewed him as a caring teacher. The teacher could have tried to develop a caring environment in his classroom in which students shared and appreciated each other's cultural backgrounds, thereby building understanding among them.

Mitchell and Myles (2004), point out that EBL students need to feel cared for by their teachers. Students perceive their teachers as caring when they take initiatives to comprehend their students' experiences and backgrounds in qualitative ways. For example, because the participants were significantly influenced by their unique set of cultural assumptions and behavioral norms, they required a level of comfort when communicating with their teachers. The teachers' limited awareness of his Arab EBL students' culture further contributed to the participants' beliefs that teachers were uncaring and uninterested in their experiences. A study by Salazer (2010) found that when EBL teachers used dehumanizing pedagogical stances in the classroom such as, 1) disregarding EBL student's language and cultural identity by promoting English-only approaches, 2) focusing on students memorization of content and skills, and 3)

maintaining low expectations for diverse learners, they created language boundaries for their EBL students, which decreased their language development opportunities. Educators must develop humanizing pedagogy that fuses content-specific and culturally appropriate teaching strategies that support the development of ethnic identity and incorporates the understanding of cultural integration among students (Gee, 1999; Lee & Fradd, 1998; Salazar, 2010). Teachers must also understand the "funds of knowledge" that their students bring to the classroom (Moll & Amanti, 2001). Although the teacher in this study used effective teaching practices in the teaching of science, he could have implemented more humanizing approaches such as promoting cultural knowledge, linguistic awareness and the integration of his EBL students' heritage and language. Such approaches would have helped increase his non-EBL students' understanding and appreciation of their EBL peer's background and culture, thereby helping creating a sense community in his classroom.

According to Gilbert and Yerrick (2001), preserving the students' cultural heritage is critical for their identity development and their sense of well-being. The school and the teacher in this study could better meet the needs of their EBL population by incorporating cultural learning that is explicit and includes language-and-culture curriculum (Moran, 2010). According to Moran, it is difficult to understand others' cultures and relate to them, even if one understands the history of the culture. In order to develop a full understanding, it is important that one be faced with the differences of other cultures and then learn from one's reactions to the differences. Even though the school had implemented some accommodations for the Arabic students (e.g., classroom time release and a location for prayer), the participants of this study did not feel their teachers and peers understood their culture.

Teacher Strategies to Facilitate Language Acquisition and Cultural Integration

Most teachers instructing EBL students are not prepared to incorporate literacy skills and language acquisition in their daily classroom instruction (Krashen, 2003). Research indicates that from a pedagogical perspective, the constructivist theory is an effective approach to scaffold, build, and explore the prior knowledge of students to enhance learning (Driver, 1983, Fosnot, 1996; Staver, 1998). According Fosnot (1996), constructivism is a theory of learning in which 02learners explore, construct and generate new ideas by engaging them in the content being taught. In science this means that students ask questions, develop hypotheses and models and design experiments. When implementing constructivist instructional methods in the classroom, EBL students are able to construct mental representations through active learning that promote cognitive processing (Fosnot, 1996; Von Glaserfled, 1993). Effective instructional strategies combine aspects of the sociocultural, sociolinguistic, and second language acquisition theories to foster students' literacy skills, and include linguistic scaffolding techniques to enrich EBL students' knowledge of complex scientific concepts (Fosnot, 1996; Staver, 1998).

The results of this study indicate that in order to facilitate language acquisition the teacher engaged his students in science inquiry lessons, involving collaborative hands-on activities. He also infused technology in his lessons and led discussions of the concepts being covered. Since such practices relied less on language instruction, it reduced the language burden for his students. Some of the science investigations were related to societal problems, which helped students to think critically and develop knowledge of the interactions between science, technology, and society (Norris & Philips, 2003; Solomon & Aikenhead, 1994). Such an educative process roots back to the idea of the socio-cultural approach, which promotes the integration of multiple viewpoints when dealing with issues; this is also evident in Krashen's (1987) theory of second language acquisition. The teacher's strategies around collaboration

improved the participants' comprehension of the science content and enhanced their reading skills (Labov, 2010; Shaffer & Zimmerman, 2003). When the teacher allowed his students to interact with the subject matter the EBL student participants performed more efficiently in their language acquisition skills and were able to master the content.

According to Brooks and Brooks (1999), all students construct meaning and social relationships through the use of language and social interaction. When Ahmed was asked about ways the teacher could improve his science teaching, he mentioned group work and projects and added that it would help if the teacher spoke Arabic. It is interesting that in his response Ahmed identified an important aspect of the instructional congruence framework (Lee & Fradd, 1998). Lee and Fradd (1998) explained that the enhancement of learning is increased and becomes cognitively meaningful when the context occurs around the learners' culture and linguistics. Although, the teacher in this study used effective strategies in the teaching of science, he could have used more instructional practices that focused around his EBL students' culture and language.

Teaching EBL students can be very challenging because not every approach can be applied to every student. Although, the teacher in this study implemented strategies that were effective in the premise of EBL instruction, he still struggled with differentiating instruction and ensuring that all his students achieved high academic standards. According to the teacher, knowing how to differentiate instruction was an instructional skill necessary when teaching EBL students.

Another area in which the teacher struggled, was on how to use a variety of discourses to facilitate scientific meaning. Gee (1999) pointed out that academic secondary discourses differ from the conversational primary discourses students often use to help organize meaning. Teachers therefore should understand the distinction between discourses and recognize that non-

specialized academic words are significantly valuable to the understanding of spoken and written scientific discourse (Norris & Philips, 2003).

The findings from this study suggest that multiple theories from the field of second language acquisition need to be implemented in order to help EBL students with language development to academically succeed in science. EBL students need to interact with native speakers so that they are more engaged with the dominate language (sociolinguistics theory), and practice implementing the rules they have learned about language (second language acquisition theory), while realizing that their cultural background is a factor in how they read, write, socialize, and comprehend (sociocultural theory). When all of these areas are combined and implemented using a constructivist perspective, language development and science learning occurs.

Second language acquisition theories, sociocultural and sociolinguistic theories are all correct in their approaches to helping individuals understand how second language learners develop a new language. However, these approaches alone do not remedy the difficulties that these students face on a daily basis. All of these theories need to be taken into consideration simultaneously in order to help EBL students with language development to further achieve academic knowledge.

Conclusion

Much of the research on second language acquisition has focused on minority groups such as Hispanic and Asian second language learners and their challenges (see Duff, 2001; Harklau, 1994; Krashen, 1987; Patthey-Chavez, 1993; Salazar, 2010). The majority of these studies found that EBL students encountered difficulties with language acquisition and social adjustment, which impeded their success in school (Harklau, 1994; Krashen, 1987; Salazar, 2010). Such difficulties with cultural displacement and communication barriers resulted in

frustration and academic failure (Duff, 2001; Patthey-Chavez, 1993). However, as group, Arab EBL students are mostly absent from such studies. Even though these students share similar struggles with other second language learners, the results of this study show that this group of Yemeni students faced unique struggles related to their cultural norms and religious practices that impacted them socially and linguistically.

Figure 2 below summarizes specific characteristics exemplified by only the male or female participants, while highlighting characteristics shared between the two groups.

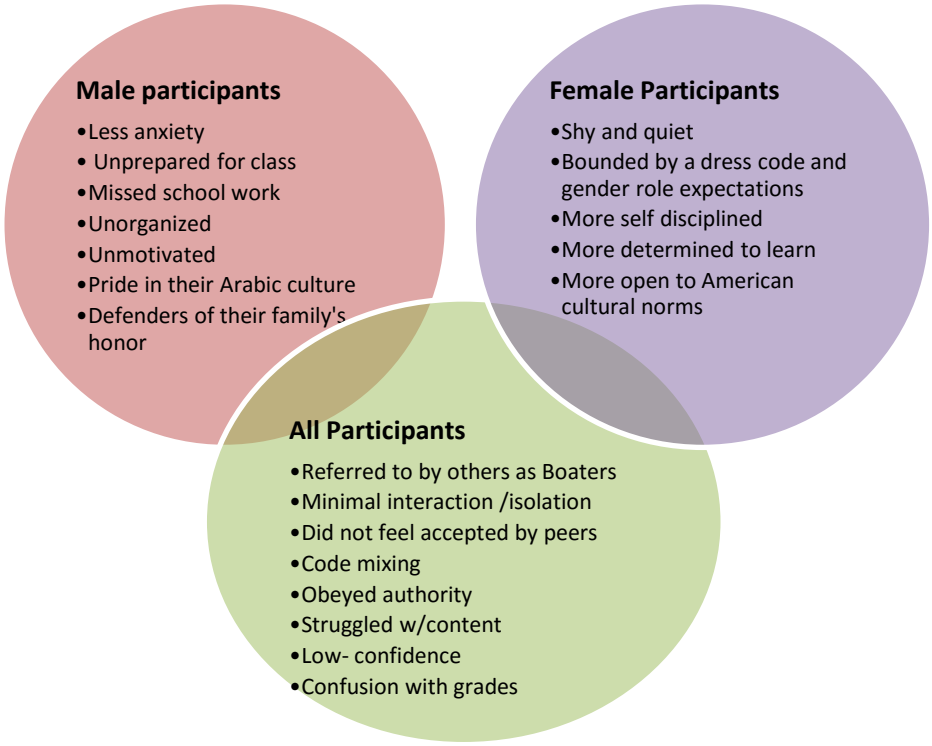

Figure 2. Similarities and differences between male and female participants

The data indicate that all the participants struggled with linguistic, social, and cultural aspects of their life in an American high school. These in turn led to a sense of being different, which resulted in isolation from their non EBL peers. The female participants experienced additional struggles due to their unique dress code that set them apart from the other female students (including those from less strict Arabic cultures), and strict cultural and religious norms

that forbade them from interacting with males or with females from cultures other than their own. As pointed out by Alkrenawi and Graham (2003), Arabic females are expected to abide by their traditional cultural values and live by strict norms enforced by their Arab society. All these issues influenced each other in different ways, resulting in limited opportunities to interact with others and develop language and cultural competency skills. Unfortunately, even though the school had a large percentage of EBL students from Middle Eastern countries, and the teacher was aware of his EBL students' struggles and used effective science teaching methods, neither the school nor the teacher had put in place approaches that helped decrease cultural stereotypes among the various student groups and facilitate integration of their EBL students into the school community. Although the school had set aside an area for prayer and practicing Muslim students were excused from class during their prayers, such accommodations did not contribute to their academic success or cultural integration. Students who left class to fulfill their prayer duties lost important instructional time and experienced scorn and ridicule from their non-Muslim peers. As a result, it was difficult for the student participants to academically succeed when language and social and cultural barriers prevented them from feeling like they belonged. This lack of belonging caused the participants to develop a negative attitude towards the American culture, which helped shape their perception of their cultural identity as Arabs.

Limitations of the Study

As with most qualitative studies, this study included a small sample of participants, which makes the findings of the study difficult to generalize to any large populations of EBL students (Creswell, 2008). This study involved only four Arab EBL students, all from Yemen, attending the same biology class in the same school. The findings indicate that Arab EBL students, particularly Yemenis, enrolled in a Michigan high school program encountered difficulties with language development and cultural transition. However, this study does not

show how other Arab EBL students across the country might experience such transition. As a result, the findings of the study apply only to these student participants in the context of Thrill-Murray High School. Only the reader can make judgements about the extent to which the findings of this study apply to other EBL students and/or educational contexts. A study involving participants from different geographical regions in the Arab World could have presented a clearer and more nuanced picture of the experiences of Arab EBL students in the United States.

Implications of the Findings for Practice

The findings of this study suggest that this group of Yemeni students would have a better perception of their US educational experience and academic achievement if multiple strategies were implemented to facilitate their language development and cultural integration. It is important for educators of EBL students to be aware of the current theories of second language acquisition, as well as the social and cultural implications of learning science while learning a new language. Educators can no longer consider second language acquisition theories in isolation. Incorporating approaches based on second language acquisition, sociocultural, and sociolinguistic theories, a more harmonious approach to learning and language development can be achieved.

Although the school and the teacher in this study were aware of their large percentage of EBL students and to some extent were aware of their daily struggles, they did not effectively provide them with the necessary resources needed to succeed. Even though, the school modified their instructional hours during the month of Ramadan, provided Muslim students with a prayer area, assigned EBL students a specific hallway, and provided interpreters during parent-teacher conferences, such accommodations did not contribute to this group of Yemeni students' academic achievement or cultural integration. In fact, when assigning EBL students to a specific hallway, in which their lockers and classes took place, it further promoted segregation between

mainstream and EBL students. Furthermore, providing EBL Muslim students a designated prayer area within the school without first developing awareness and understanding of mainstream students about such practices, resulted in ridicule and bullying from the non-Muslim students. Indeed, if the mainstream students possessed greater awareness and knowledge of the participant's religious and cultural norms, it would most likely increase social interactions and respect among the various groups. Given the large population of Muslim students in the school, implementing activities/events/lessons that promote cultural understanding and diversity would most likely decrease misunderstandings among the students. Such practices would also help develop a sense of community and belonging, which would positively impact the participant's perception of their educational experience. These approaches fit within the sociocultural theory in terms of communicating and acknowledging cultural variation in the educational setting (Vygotsky, 1978).

A school with a significant EBL student population should consider implementing professional development for its teaching staff to help them become familiar with their EBL students' cultural backgrounds, their sociolinguistic challenges and enhance their instructional methods. Instructional approaches such as the instructional congruence model show promise in increasing EBL students' motivation and achievement in science (Fradd & Lee, 1999; Salame, 2015). According to VanPatten and Lee (1999, proper instruction and facilitation can ease the hardships that EBL students face. Educators, regardless of the subject matter, need to use strategies that provide congruence between their students' culture and the content being taught. Teachers in a country with an increasing number of students from different cultural and linguistic backgrounds need to be better prepared to meet the needs of these students in order to minimize acculturation conflicts and increase language development.

Recommendations for Future Research

Further research in the field of second language acquisition is needed, particularly on populations of students who come from unique backgrounds such as those in this study. Future studies could explore the lived experiences of Arab EBL students in other areas in the United States and from different areas of the Middle East such as Lebanon, Iraq, Jordan, and others. More research is needed on the interplay of culture and religion in facilitating or hindering these students' transition from their native culture to the American culture. It is also important to study the role that age, gender, socioeconomics, and level of religious practices play is such transition. The results of this study show that in addition to language and cultural barriers, some of the challenges that the students experienced were related to the lack of school practices that could have facilitated the participants' integration into the school community. Similarly, even though the teacher was aware of the challenges the participants experienced and he used effective practices related to the teaching of science, he did not use approaches that could have helped in his non-EBL students' understanding and appreciation of their EBL peer's background and culture. As a result, more research is needed on effective practices that schools and teachers can use that facilitate their EBL students' cultural integration and language development, and promote cultural understanding among different groups of students.

APPENDIX: INTERVIEW QUESTIONS

The purpose of the interview in the protocol and information/assent form is to give students the opportunity to provide their perspectives on their transition into the U.S educational system, focusing on their success, challenges and needs. The following open ended questions will lead to further questioning if necessary based on the students responses for further clarification of their social and linguistic challenges.

1. What social challenges did you face in the science classroom the first month of your arrival to the United States? And how has that affected your mood to learn?
2. How did the lack of the English language affect you emotionally and mentally in the science classroom? And how did that make you feel?
3. Was there anything that seemed particularly strange, confusing, funny, or hard to get used to in an American school? And what type of stressful situations made you feel worried, nervous, or frightened? And How can the school help eliminate stressful situations that you encounter and ease your transition?
4. How is the culture different in your classroom versus back home? Is there issues of isolation or withdrawal from your peers and how does that make you feel?
5. What has helped you learn the most in a science classroom both academically and linguistically? And who do you feel comfortable interacting with in the classroom that can improve your academic needs?

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ABSTRACT

UNDERSTANDING THE EXPERIENCES OF A GROUP OF YEMENI STUDENTS IN AN ESL SCIENCE CLASS

by

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American classrooms are experiencing an influx of diverse language speaking students while for science educators the study of EBL students' learning in science classrooms is a relatively new field (Lee & Buxton, 2010). At the same time there is a growing emphasis on the importance of science practices (NGSS). This poses significant challenges for science educators who are enacting science curriculum that supports all students' learning. Supporting EBL students' academic achievement is significant because literacy is important for students' access to economic and social benefits that come with science literacy (Atwater, 1996).

The purpose of this study was to examine the socio-linguistic challenges that a specific group of EBL students (Yemeni) faced and the extent to which such challenges affected their academic performance in science. These challenges are related to linguistic and cultural interactions, which can lead to conflicts between student and school, thereby interfering with the effectiveness of their education. This study also examined these students' and their science teacher's perspectives on strategies that can be used to facilitate their language acquisition during science class and help them become active participants in the school and classroom communities.

The study used a qualitative interpretive research methodology and involved four Arab-American EBL students (two males and two females) from Yemen, who had been in the US for different periods of time. The amount of time these students had been in the US was important to examine differences in their acculturation and challenges they faced. Similarly, the use of female and male student participants was important to understand the impact of gender in the lived experiences of these students.

The results of the study indicated that all the participants struggled with linguistic, social, and cultural aspects of their life in an American high school. These in turn led to a sense of being different, which resulted in isolation from their non EBL peers. The female participants experienced additional struggles due to their unique dress code that set them apart from the other female students (including those from less strict Arabic cultures), and strict cultural and religious norms that forbade them from interacting with males or with females from cultures other than their own. All these issues influenced each other in different ways, resulting in limited opportunities to interact with others and develop language and cultural competency skills. The results also revealed that even though the school had a large percentage of EBL students from Middle Eastern countries, and the teacher was aware of his EBL students' struggles and used effective science teaching methods, neither the school nor the teacher had put in place approaches that helped decrease cultural stereotypes among the various student groups and facilitate integration of their EBL students into the school community. As a result, it was difficult for the student participants to academically succeed when language and social and cultural barriers prevented them from feeling like they belonged. This lack of belonging caused the participants to develop a negative attitude towards the American culture, which helped shape their perception of their cultural identity as Arabs.

AUTOBIOGRAPHICAL STATEMENT

Gihan Fradi is an educator with over seven years of teaching experience. Prior to pursuing her Ph.D. degree in Curriculum and Instruction (Science Education), Gihan held two degrees: Masters of Arts in Teaching and Bachelors of Science in Biology. She is certified to teach Biology and Chemistry; and is currently teaching chemistry and advanced placement environmental science at Dearborn Public Schools. Gihan is the head of the science department and is also certified in STEM (Science, Technology, Engineering, and Mathematics), SIOP (Sheltered Instruction Observation Protocol), RA (Reading Apprenticeship) and Blended Learning. In addition to holding a full time teaching position, Gihan is currently the associate director at STEM.org where she designs and develops instructional materials specifically for K-12 STEM education.