Korean Immigrant Parents’ Ways and Reasons to Support Their Elementary-aged Children’s Mathematical Meaning-Making at Home during the COVID-19 Pandemic

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Abstract

U.S. society perceived some Asian immigrants as a model minority, even assuming that Asian students would be good at mathematics. However, the narratives and experiences of Korean immigrant parents and their children were not discussed in these perspectives. The purpose of this study is to understand the interactions and reasoning of Korean immigrant parents about their children’s mathematical meaning-making at home. The study investigates the following research questions: How do Korean immigrant parents of elementary-aged students support their children’s mathematical meaning-making at home during the COVID-19 pandemic? Why do Korean immigrant parents of elementary-aged students support their children’s mathematical meaning-making at home during the COVID-19 pandemic? Using the theory of belonging, model minority stereotypes, and meaning-making, this study critically examines Korean immigrant parents and children how and why negotiate the meaning of U.S. mathematics. Narrative inquiry is used to understand the diverse experiences of the five participants' families through interviews, observations, and debrief sessions. The findings report how and why Korean immigrant parents support their children’s mathematical meaning-making using code-switching and cultural negotiation that addresses conceptual differences across language and culture. On a personal level, Korean immigrant parents' desire to belong in U.S. society guides them to put effort into their children's education. On a societal level, the parents in this study wish for their children to overcome perpetual foreigner stereotypes, myths, and glass ceilings around them. Yet because of their limited connectedness to mainstream society, they feel they lack the information needed for their children to be successful. Their voices demystify the model minority stereotypes and counter the argument that mathematics education serves as an absolutely inclusive subject. Recommendations from this point on the school districts and
educational system are to have explanatory sessions for immigrant parents to help their understanding of the U.S. curriculum, and at the same time, teachers also can take advantage by having listening sessions about multiple ethnic parents to learn the cultural meaning-making to make a connection between school children and their culture in the curriculum. Furthermore, the higher education system could recruit more diverse pre-service teachers to create more belonging for diverse learners. Last but not least, school teachers can learn and practice immigrant experiences and try to demystify racial stereotypes in classrooms.
Dedication

This dissertation is dedicated to my parents, my parents-in-law, my husband, my two children, and God who always encouraged me to move forward in terms of education. They helped me to study in the U.S. Everything was uncertain but now this dissertation is finished, and it is clear that I am loved by you, and I love you.
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This land is your land, and this land is my land

From California to the New York Island,
From the Redwood Forest to the Gulf stream waters, God blessed America for me.
This land was made for you and me.

-A folk song. This land was made for you and me.

Being a member of a minority race doesn't mean being a minority achiever.

Dr. Ben Carson
Education Fever and Korean History

Historically, the competitive environment of education is prevalent but perceived as an unavoidable phenomenon in Korea. The competitive nature of education in Korea can be traced back to the Korean War which ended in 1953 (Lee & Brinton, 1996). Korea had an extremely strict social hierarchy during the Joseon dynasty. But, during the Japanese occupation (1910-1945) period, this social stratum has been challenged because Korean people were governed by Japanese supervision. Because during this time, people who follow the Japanese government gained more authority and opportunity, and economic resources (S. Kim, 2007). Besides, after independence in 1949, the land reform law was activated to give an opportunity to re-distribute the land for the poor people—if they grow plants from the borrowed land, and if they pay back to the landlord 30 percent of the yield for five years consistently, they could earn the land, the maximum size of land per family was 30,000㎡ (7.41 Acre) (Jeong, 2006). Then, the country was destroyed by the Korean War (1950-1953). Thus, after the Korean war, most people were poor after the demolition by the bombs and killing, but in the meanwhile, opportunities in terms of social mobility increased to move upward in social status as a government officer, or into white-color jobs as Korea economically developed with rapid economic growth. Accordingly, increased demand for a workforce with higher education degrees including university diplomas created social mobility in Korea. For example, in 1965, about 57 percent of Korean people had occupations related to agriculture, but in 1990, only 21 percent of people worked in the same sectors. Rather, professional, managerial, and clerical occupations have grown to 25 percent (Lee & Brinton, 1996). Thus, with higher educational degrees, people occupied those socially and economically admired white-collar jobs as a “new middle class” (Lee & Brinton, 1996) in Korea. Thus, parents value education at the top of their lists, which is called “education fever” (Seth,
2002, p. 1). Presumably, this is not a real physical fever, but it is a kind of metaphor that stresses how Korean parents put their effort into their children’s education.

Studying hard has been believed as a virtue to climb the ladder of success in Korean society. However, after the rapid economic growth of Korea since the 1950s, social mobility has been steadily stabilized among people who inherited the economic capital and social capital from their parents’ generations (Chung & Park, 2019; H. Kim, 2017). Social mobility has been commonly represented in media since 2015 (H. Kim, 2017); a metaphor of the gold spoon (Geumsujeo, 금수저) represents people who are born in rich family backgrounds and a dirt spoon (Heuksujeo, 흙수저) represents who are born in a not rich family. However, educational attainment became a more significant factor for the parents to pass their benefits down to their children. Parents who want to give their social, cultural, and economic resources to their children have taken the strategy to invest their available resources in their children’s education. Taking advantage of their parents’ social, economic, and cultural resources accelerates more unequal opportunities through education and career paths.

Korean immigrant parents are indirectly or directly influenced by these prioritized values of education from their historical backgrounds. These backgrounds are distinguished from universalized meaning as Asian as a group, rather these became Korean unique storylines. Korean immigrant parents go through various social and cultural layers around them: Korean, different cultures, languages, communities, children, immigration, education, careers, gender, roles, expectations, and so on. The experiences related immigration is contingent on each other that shape the meaning and ways of Korean parental involvement at home while they are living in another country (M. Lim, 2009).
Problem Statement

This study explores how and why Korean immigrant parents of elementary-aged students support their children’s mathematical meaning-making at home during the COVID-19 pandemic. Korean immigrant parents, as well as other parents, have faced new challenges in supporting their school-aged children because of the COVID-19 pandemic. In addition to the burden of supervising and caring for children's academic progress at home, Korean immigrant parents navigate the model minority stereotypes toward their children in addition to differences in language, culture, curriculum, and so on. Korean immigrant parents in the U.S. invest in their children’s education because they believe education is key to their children’s success in life as well as their assimilation into U.S. culture (H. Kim, 2019). Mathematics education is particularly important to most Korean immigrant parents because Korean immigrant parents believe having advanced mathematics skills in schools assure their children have more opportunities and economically stable careers such as STEM areas (H. Kim, 2019). They also feel more familiar with supporting their children’s mathematics than the other subjects because mathematics requires less use of English than other subjects and uses symbols that transcend language (H. Kim, 2019). However, still, language barriers are one factor that hinders Korean parents’ ability to support their children (E. Kim, 2002).

In addition to language differences, Korean immigrant parents also navigate stereotypes about Asian people such as ‘Asians are good at mathematics,’ and the image of Asian parents as ‘tiger mom or tiger dad’ who strictly supervise their children’s lives. Model minority stereotypes came from history tracing back to the yellow peril in the 1950s. While highlighting Asians’ capability in education shows their over-smartness as an awkward (not assimilated figure) in the U.S. too. (Shah, 2019). The stereotype might attribute their achievements to inherited ability
rather than their effort. And, several researchers in mathematics education insist that those stereotypes are problematic and even harmful since they create a hurdle for the Asian population (Nasir & Shah, 2011; Shah, 2019).

In the United States, Asian is a universalized category (Popkewitz et al., 2014) that cannot truly capture the variances of people. Asian countries do have different regional areas that are related to various histories, languages, and cultures: North Asia (Siberia), Central Asia, Western Asia (The Middle East or Near East), South Asia (Indian subcontinent), East Asia (Far East), and Southeast Asia (East Indies and Indochina). Even in the same east Asian countries, they use different languages based on history and culture, for example, Korea and China are neighboring countries but their main language is different in grammar, letters, and vocabulary. According to Hasnain et al., (2020) Asian students are often represented as one group of people in the literature with model minority stereotypes although they have different experiences and backgrounds. However, a person experiences the model minority stereotypes differently. In a study by Trytten, Lowe, and Walden (2012), a Korean student who is 1.5 generation asserted the stereotypes toward all Asians are problematic since they do represent and cover all individuals’ differences. Rather, G. Park (2011a) asserts that Korean American students individually experience identity formation differently to internalize the image of a model minority as a part of schooling.

Although prior researchers take race as an influential factor in STEM education (Martin, 2009; Nasir et al., 2009; Stinson, 2013), Asians have received little attention in education (Shah, 2019). Korean immigrant families, in particular, receive less attention (H. Kim, 2019). Since the Korean immigrant population is one of the fast-growing Asian immigrant populations in the U.S. (U.S. Census Bureau, 2011), this group of people needs more attention in education research.
Elementary-aged students rely on parents’ support in their academic progress more than older students (S. Kim, 2019a; S. Kim, 2019b). When Korean parents support their children, they also are aware of all the stereotypes, language, culture, and curricular barriers that they face. E. Kim (2002) argues that Korean parents’ involvement in students’ academic progress helps to overcome language, culture, and academic difficulties. Korean immigrant parents help their children to succeed academically as a way to support their acculturation and a sense of belonging by supporting their children's academic progress including mathematics learning at home (H. Kim, 2019). Nonetheless, there is scarce research about how Korean American parents support their children’s learning (H. Kim, 2019).

During the COVID-19 pandemic since March 2020 in the U.S., most school districts decided to provide remote schooling to prevent the spread of the virus and to protect children. However, a major problem with this kind of adjustment for the parents is that this situation extends the parents’ responsibility. Because, for their physically staying at-home children, parents at home take the main role of supervising children’s academic progress and well-being 24/7 (Garbe et al., 2020): supervising their children taking classes, working on home assignments, communicating with the teachers and schools, preparing lunch and snacks, and limiting the time of exposure to video games, watching TV or social media, and so on. Parents’ responsibility is added to their primary duties at home and work.

This study uses concepts of belonging (Yuval-Davis, 2011), model minority stereotypes (Wing, 2007), and meaning-making (Pitvorec, 2016) to examine how Korean immigrant parents support their children to learn mathematics at home. By employing narrative inquiry, this study focuses on parents’ narratives and collective narratives of mathematical meaning-making between parents and children. Because parental support has a significant impact on their
children’s mathematics learning and understanding (Sénéchal & LeFevre, 2002), this study investigates how Korean immigrant parents support their children’s mathematics learning and the difficulties that they face during the COVID-19 pandemic and beyond.

**Review of Literature**

This section delves into the current state of the research field about Korean immigrant parents of elementary-aged students’ ways and its reasoning of support in mathematical meaning-making at home during the COVID-19 pandemic. To navigate the research question, this section is divided into broadly four sub-sections: deconstructing Asian in education literature, Asian and Korean immigrant children’s mathematics learning, parental involvement in mathematics education, and the COVID-19 pandemic and remote schooling. In the beginning, the sub-section sketches the relationship between Asian and Korean, because Korean immigrants are frequently discussed among the Asian immigrant population, then looks at Asian and Korean immigrant children’s learning. Besides, since this study aims to contemplate how Korean immigrant parents support their children’s mathematics learning, the next part of this section discusses the literature about parental involvement. The last sub-sections highlight parents’ and children’s remote schooling during the COVID-19 pandemic.

**Deconstructing Asian in Education Literature**

‘Asian’ is an umbrella term that covers all Asians under the same category regardless of their countries of origin. Admittedly, some Asians may have some cultural similarities. However, dealing with Asians as a homogeneous group of people can be problematic because it neglects “ethnic otherness” (Lowe, 1991). Ethnic otherness is acknowledging differences among cultures, languages, traditions, histories, and so on. Likewise, using the term ‘Asian’ to cover all Asian students in education is a bit of a diffusive way of labeling or misrepresenting them; that term
cannot truly capture the different backgrounds and experiences across all Asian populations. For example, Asian Americans’ achievement data are often compared to White American, African American, and Latin@ American students (Covarrubias & Liou, 2014). The data consolidates the racial disparity such as Asian Americans and White Americans performing better than African Americans and Latin@ American students. However, according to Covarrubias and Liou (2014), highlighting Asian students’ scores to compare other racial groups can mislead while it ascribes their educational success to racial backgrounds despite existing marginality and discrimination.

Martin (2009) argues that achievement should not be explained only by race. Rather, it should be explained with the historically constructed and sociopolitical context that is related to race. Therefore, discussing all Asians together under the pan-ethnic category will be a misrepresentation and racialization (Lee, Park & Wong, 2017). Histories and sociopolitical backgrounds vary widely in Asian populations. As a result, distinguishing small groups among Asians will be a beneficial approach to understanding the variety of Asian experiences in educational research. Accordingly, several scholars in education (e.g., Lee, Park & Wong, 2017; Lowe, 1991; G. Park, 2011b) admit heterogeneity should be highlighted across Asian students, although the current literature in education still shows the collapse of the category into Asian American. Students grouped in the Asian category are aware of themselves as different from one another, and some report uncomfortable feelings when they are discussed as one group of people (G. Park, 2011b). Furthermore, education is a cultural practice that includes cultural values, cultural stories, identities, cultural artifacts, systems, and so on. In consequence, it will be crucial to distinguish each group of people and separately discuss a specific group such as Korean American, Japanese American, Vietnamese American, and so on. For example, C. Park (1997) points out that learning styles among Asian students differ based on their national origins. Also,
C. Park (1997) said that Filipino and Vietnamese students prefer cooperative learning with group activities while Korean and Chinese students feel more comfortable in pair work than in group learning environments. This means that students come from different cultural backgrounds that bring their different learning styles. Taken together, looking at specific groups of people in Asia will be beneficial in educational research.

Parenting is one area in which the Asian category is used as the foundation of the stereotypes. One stereotype of Asian parenting is the tiger mom. The tiger mom is an Asian mother who strictly supervises all aspects of their children’s lives (Chua, 2011). Tiger parents are viewed as parents who discipline their children with the importance of family obligation and academic achievement with less warmth and less democratic environments (S. Kim et al., 2013). This term is an example of “monolithic notions of parenting” (Juang, Qin, & Park, 2013, p.1). Although there may be commonalities in the way that different Asian people parent, parenting approaches also vary across subgroups. There could be Korean cultural customs, ideas, or ways of being that influence parenting. By looking at Korean families' narratives, this study provides additional specific information about the experiences of Korean parents.

**Asian and Korean Immigrant Children’s Learning**

This section turns to studies about Asian immigrant and Korean immigrant children’s learning and how differently they learn as minor populations in the U.S. Because there has been little attention on Asian immigrants, and less literature about Korean immigrants, this section begins with the literature about Asian immigrant children before looking at Korean immigrant children specifically.

Children of Asian immigrant families face various challenges in learning. In the late 20th century, E. Yao (1985) discussed the adjustment needs of Asian immigrant children in her article
in the book *Elementary School Guidance & Counseling*. In terms of learning style, Asian children are more likely to be field-independent learners (E. Yao, 1985). Field-independent learners prefer to engage passively in a structured and quiet learning environment. These learners do not very actively speak out their opinions or challenge their instructors. Even if they know the answer, they prefer to sit quietly and not raise their hands.

In addition to different learning styles, immigrant children experience greater peer pressure than American-born children (E. Yao, 1985). According to E. Yao (1985), Asian immigrant children accommodate their cultural traditions when they socialize with other peers in the new country, and it frustrates parents who want their children to inherit the traditional way of being. Although this peer pressure influences an adjustment for the immigrant children, they are hesitant to report or receive counseling due to a lack of cultural familiarity with the service or trying to avoid revealing their problems (E. Yao, 1985). Asian American youth are hesitant to reveal their mental health problems due to cultural reasons. For example, they are concerned about making their family ashamed of them when they reveal their academic struggles (S. Lee, 1994). Besides, Asian American students also can experience the culture shock resulting in feelings of anxiety when they are unable to use the problem-solving strategies they used in the past (Yeh & Inose, 2002). For example, as a Korean immigrant, when I arrived in the U.S., I did not have enough information about where to buy Korean products since I lived in a rural small town that had no Korean market. Thus, my problem-solving skills in grocery shopping did not work. Thus, I asked this question to the Korean online community and the people there helped this problem by sharing their know-how.

The difficulties of Asian immigrant students are an ongoing phenomenon. In more recent research, Yeh and Inose (2002) assert that, compared to non-immigrant students, Asian
immigrant youth are vulnerable figures who experience more psychological problems such as depression, low self-esteem, anxiety, and loneliness when they deal with “racial discrimination, racial stereotyping, language barriers, and intergroup conflicts and tensions” (Yeh & Inose, 2002, p. 71). Yeh and Inose (2002) find the biggest challenge for Asian immigrant youth are communication difficulties, and this hinders their communication with non-immigrant peers.

In addition to psychological problems, Asian American students deal with various academic difficulties including mathematics. Although Asian Americans have been considered a model minority who successfully acculturated or assimilated into a major culture, Asians are not significantly different in mathematics achievement (Chen & Stevenson, 1995). Rather, Yan and Lin (2005) point out that the reason for Asians’ successful mathematics performance can be found in parents' involvement in children’s math achievement with high expectations (Yan & Lin, 2005).

Asian American students experience the burden of the stereotypes and even face microaggressions toward them when they are not good at mathematics (S. Lee, 1994). S. Lee (1994) reports one participant reveals the feeling of being seen as a “mutant Asian” (p. 426) who is not good at mathematics or science. The student says, “[I]f you don’t do that well in math or science, the teacher is like, “What are you? Some kind of mutant Asian? You don’t do well in math...You see, I’m not that good at math. I also find that a lot of my friends become upset if they’re not good students” (p. 426). The excerpt shows that students who failed to fit in the image of ‘Asians are good at math’ and reveal their struggles at school also experience a lack of belonging.

Model minority stereotype is problematic for the Asian American population in general. According to Oyserman and Sakamoto (1997), the majority of Asian Americans did not like to
be perceived as the model minority: 51.7% of Asian Americans expressed negative feelings, 26.3% expressed positive feelings, and 15.9% expressed ambivalent feelings toward the label of model minority (p. 446). Wu (2002) reports the model minority is a myth, “I am not the model minority...I am an Asian American, but I am not good with computers. I cannot balance my checkbook much less perform calculus in my head. I would like to fail in school for no reason other than to cast off my freakish alter ego of geek and nerd” (p. 39). The narratives in Wu’s study illustrate the model minority stereotypes might become threat for Asian American students’ identity development.

**Korean American or Korean Immigrant Students**

In this section, I will discuss the current literature about Korean American and Korean immigrant students to see a more detailed story of their experiences in learning. According to Yeh and Inose (2002), there are fewer studies on Asian immigrant students’ voices and experiences in learning. Furthermore, Korean immigrant students are less discussed compared to other immigrant students (Y. Choi et al., 2011). Thus, this study specifically focuses on Korean immigrants’ learning that hasn’t been addressed.

For some Korean American students, the model minority stereotypes that see these students as academically capable figures could be a positive coping mechanism (G. Park, 2011a). In G. Park’s (2011a) study of Korean immigrant students, Korean students employed that stereotype to encourage themselves to work harder as a coping strategy when encountering marginalization. Some Korean American students recognize that they are racially marginalized because of the color of their skin, the shape of their eyes, and their accent. These students use the model minority stereotypes as a coping strategy to be seen as smart and diligent people (G. Park, 2011a). Conversely, generally speaking, model minority stereotypes work negatively. Choi and
Lim (2015) assert that Korean immigrant students take a coping strategy of self-silencing and self-blaming to create the image of Korean as “uncomplaining, quiet, obedient, and nerdy” (p. 69). Some Korean immigrant victims of racial bullying have adopted the model minority image to claim their ethnic superiority or have become inflictors of racial bullying (Choi & Lim, 2015). From these results, Choi and Lim (2015) insist that Korean students consciously or unconsciously internalized the racial bias that they criticized and are victimized as a self-protective action to their experiences of racism. Choi and Lim (2015) insist that model minority stereotypes are detrimental by sharing an example that a student who had a hard time when he did not fit in the image of smartness and blamed himself: “Yunho, an academically struggling high school senior, confessed he often felt shameful of his failure to meet the model minority expectations not only from mainstream peers but also held by those who are of Korean descent” (p. 60-61). Due to the coping strategies of self-blaming with silence, Korean immigrant students do not appear to need the institutional support to navigate racial barriers around them (Choi & Lim, 2015). Furthermore, Korean immigrant students are the least likely group to seek social help, so they are not willing to open up about their mental problems compared to Chinese and Japanese students (Yeh & Inose, 2002). However, when students do not share their hardships, the problem is hidden, which does not mean that there is no problem. Even if they seek help, there has not been appropriate support. For example, Choi and Lim (2015) report a student asked to help her homeroom teacher about being a victim of racial bullying, but the situation did not change at all. Within this vicious cycle of silence and unchanging situations, the model minority myth is immortalized in the lives of Korean immigrant students (Choi & Lim, 2015).

**Challenges and Strengths of Korean Immigrant Students in Mathematics**
Model minority stereotypes create the image of ‘Korean immigrant students will be good at mathematics’. For example, in the study of Choi and Lim (2015), one student who just immigrated to the U.S. was approached by her classmates to help with math problems assuming that she was good at mathematics. But she was surprised by that assumption. She defined herself as a SUPOJA, a person who has given up working on mathematics (Cho, 2019; J. Jang, 2019). So, her classmates’ assumptions about her contradicted her math capability and belief in mathematics. She had to work hard in math to fulfill her peers’ expectations (Choi & Lim, 2015).

Although there has been a prevalent stereotype that Asians are good at math, some Korean students identify themselves as SUPOJA. This uncovers the problem of categorizing Asian students as a group of math people.

In the mathematics curriculum, mathematical terms become a challenge for immigrant people based on differences in language and culture. There are different cultural uses of the number system. In terms of the unit of measure, for example, the U.S. and Korea use different systems, such as inches versus centimeters, gallons versus liters, feet versus meter, Fahrenheit versus Celsius, and miles versus kilometers. Also, the unit of money is different, dollars versus won. The language also affects how students read word problems. In the U.S., subtractions can be suggested like this. “subtract 5 from 10” but in Korea, the common expression is “10 minus 5” which is the larger number that comes before the smaller number in a sentence. Because of the different logical orders of the number expressions, the researcher of this study personally had a little bit of a hard time filling her tax return despite being a mathematics education doctoral student. Likewise, H. Kim (2019) points out that Korean immigrant parents have a hard time teaching their children due to different terms in mathematics. When Korean immigrant parents try to support their children, they are not familiar with the mathematical words in English in the
Conversely, bilingualism could be an asset to immigrant students’ learning of mathematics (Estes & Choi, 2014; Moschkovich, 2007). According to Estes and Choi (2014), immigrant students could take advantage of the strengths of immigrant families. “A third-grade immigrant student Y’s dad had to help her translate the language of the word problem from English to Korean. Thinking in Korean, Y understood what mathematical processes were needed to solve the word problem and then she was able to proceed” (p.1). Besides, when teachers can help with the knowledge of mathematics and provide a culturally appropriate mathematical curriculum, immigrant students can achieve academic success in mathematics. According to Estes and Choi (2014), mathematics is not just symbols; it relies on languages and social context, and having an understanding of two different cultures could be a beneficial stimulus for immigrant students. Also, Moschkovich (2007) finds a beneficial effect of bilingual children using two languages in mathematical understanding.

Another example of the potential strength of having two language competencies for the Korean learner is the naming structure of geometry terms. For example, when you look at the Korean language with geometry shapes, you can find the naming structure has a pattern compared to English (See Figure 1): Triangle (Sam gak Hyeong-삼각형 (三角形)-three-angle shape), Square (Sa gak Hyeong-사각형 (四角形)-four-angle shape), Pentagon (O gak Hyeong-오각형 (五角形)-five-angle shape), Hexagon (Yug gak Hyeong-육각형 (六角形)-six-angle shape). The ‘gak hyeong’ has the meaning of ‘angle shape’ and the only part that changes is the front number that shows how many angles within the shape. This is a kind of accumulating numbers in a naming structure to connect the shape of the name. Thus for the Korean students, if they understand the naming structure in Korean, it could be a benefit to understand geometry
concepts. Although it is still unclear whether having two languages in mathematics is beneficial or not, this study will examine how Korean immigrant parents and their children understand mathematical language by looking at the interaction between Korean immigrant parents and their children in home-based mathematics learning. To recap, various literature reveals that Korean immigrant students live with challenges in mathematics learning in the U.S. including model minority stereotypes, and cultural and linguistic differences.

**Figure 1**

*Korean Polygon Terms and the English Polygon Terms*

<table>
<thead>
<tr>
<th>Polygon</th>
<th>Korean</th>
<th>English</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Triangle" /></td>
<td>3 Angle Shape&lt;br&gt;Sam Gak Hyeong&lt;br&gt;삼각형(三角形)</td>
<td>Triangle</td>
</tr>
<tr>
<td><img src="image" alt="Square" /></td>
<td>4 Angle Shape&lt;br&gt;Sa Gak Hyeong&lt;br&gt;사각형(四角形)</td>
<td>Square</td>
</tr>
<tr>
<td><img src="image" alt="Pentagon" /></td>
<td>5 Angle Shape&lt;br&gt;O Gak Hyeong&lt;br&gt;오각형(五角形)</td>
<td>Pentagon</td>
</tr>
<tr>
<td><img src="image" alt="Hexagon" /></td>
<td>6 Angle Shape&lt;br&gt;Yuk Gak Hyeong&lt;br&gt;육각형(六角形)</td>
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**Korean Parental Perspectives on Education**

This section will provide important contextual information regarding how Korean parents see education differently. Before understanding how Korean immigrant parents support their children, it is crucial to understand how they perceive and value education. For example, Korean
immigrant parents might put their top priority on education due to their Korean historical backgrounds, their own schooling experiences, family values, and so on.

One of the important reasons for immigrating to the United States of Korean parents is the children’s education. Sohn and Wang (2006) show why Korean parents value the U.S. school system. The Korean immigrant parents believe the U.S. school system is a positive place for their children’s academic growth. Sohn and Wang’s (2006) research captures parents’ two reasons for preferring the school and learning environment in the U.S.: the child-centered approach that encourages individualistic thinking and the less competitive school atmosphere compared to Korean college preparation even in elementary-aged students. However, among those two reasons for adhering to the U.S. school system (Sohn & Wang, 2006), the researcher will focus on the Korean competitive atmosphere as an influential factor, since the Korean curriculum, especially elementary education, is also employing the child-centered approach (C. Kang & Jeong, 2009) since the fourth national curriculum reform in 1981.

Specifically, in Korean parents’ perspective of mathematics, Leung (2008) points out East Asian countries have different perspectives and systems on evaluation in mathematics education. His argument is crucial to understanding how Korean parents bring their identity or perspective to their children. According to him, the East Asian education system including Korea values on-time efficiency and accuracy of problem-solving for the testing. But, the western mathematics curriculum values the relevance to the students and students’ enjoyment of the subjects. Another example of pursuing rigorous mathematics in testing can be seen with the use of the calculator. In the Korean school system, calculators are not officially allowed during exams including Korean college entrance exams. That suggests that students should use handwritten calculating or brain mathematics to solve the problems, while college entrance exams
such as the ACT or SAT allow students to use a mathematics calculator such as Texas Instruments TI-84. Since Korean immigrant parents come to the U.S. in their 20s or later, their educational experiences may reflect this cultural value toward mathematics learning and evaluation systems.

**Parental Involvement in Education**

This section provides background information about parental involvement in the current literature with the categories below: parental involvement in education, home-based parental involvement in education, home-based parental involvement in mathematics education, and home-based Asian and Korean parents’ involvement in education.

“The importance of parental involvement in children’s learning has never been in doubt” (Sénéchal & LeFevre, 2002). The quote shows parental involvement itself has a positive relationship with their children’s learning. Parental involvement in education is defined as “parents’ interaction with schools and with their children to benefit their children’s educational success” (Wang & Sheikh-Khalil, 2014, p. 611). The positive relationships between effectiveness and early parental involvement in learning are frequently discussed for several decades (Parker et al., 1999). According to Berthelsen and Walker (2008), parents' involvement and children's learning competence go together. Thus, parents’ appropriate support for learning is viewed as advantageous for children’s academic success (E. Kim, 2002).

More specifically, parental involvement in education has three dimensions: involvement at school, involvement at home, and academic socialization (Wang & Sheikh-Khalil, 2014). School-based involvement is related to parents’ participation in school and school communities such as parent-teacher communication, attendance at school events, and volunteering. The majority of research on parental involvement has covered the first dimension of school-based
parental involvement that positively influences children’s performance in school (Sy, 2006). Home-based involvement happens at home and in local communities such as monitoring schoolwork and progress, supervising homework, setting time or location to do homework, and exploring local places, libraries, or museums. Academic socialization is communication with their children, sharing parental expectations about schoolwork and the importance of education, encouragement of educational goals, and making plans and preparations (Wang & Sheikh-Khalil, 2014).

Among these three categories of parental involvement in education, during the COVID-19 which allows an online learning environment, this study will focus on home-based parents’ involvement and academic socialization of sharing expectations in mathematics education.

**Home-Based Parental Involvement in Education**

Compared to school-based parental involvement, researchers point out there has been little attention to home-based parental involvement in education (Suizzo et al., 2014; Sy, 2006). According to Suizzo et al. (2014), home-based parental involvement in young children’s learning varies between cultures with different ethnic groups. Suizzo et al. (2014) interviewed African American mothers, European American mothers, and Mexican American mothers of 1-6 years old children who are middle class and have college degrees, and the results suggest: 1) African American mothers put a priority on educational attainment since they desire their children to attend college or graduate school while pointing out the persistence of racism. To overcome racism, African American mothers perceive academic socialization as one crucial factor, plan to be actively involved in their child’s schools, and encourage them to overcome barriers. 2) Mexican American parents see challenges to educational achievement that is more likely related to their social context such as financial barriers, compared to mentioning racial barriers (only
two people mentioned). To overcome the difficulties of their children’s learning, Mexican American mothers ensure possible learning experiences with emotional warmth. 3) European American mothers generally expressed an attitude about not pushing and not fearing educational barriers while they still provide educational resources at home. Taken together, Suizzo et al. (2014) insist that different ethnic groups’ parental involvement and their perspectives on education and racial marginality lead to their type of parental involvement. Notably, the study did not include the Asian American population, and that still shows Asian American and Korean immigrant people have received less research attention.

**Home-Based Parental Involvement in Mathematics Education**

In mathematics education, home-based parental involvement is one crucial factor to prop up to children’s mathematical understanding (Hyde et al., 2006). By employing the theory of scaffolding (Rogoff, 1990; Vygotsky, 1978), Hyde et al. (2006) examine mother and child interactions while mother and child are working on challenging mathematics problems from the homework. They used pre-algebra equivalence problems of type $3 + 4 + 5 = 3 + \_\_\_$. From their results, the researchers suggest that children understand mathematical concepts better by receiving parental support from home.

Home-based parental involvement in mathematics also reduces mathematics anxiety which works as a hindrance to learning mathematics. It also improves children’s success in mathematics. According to Vukovic et al. (2013), parents help to reduce mathematics anxiety that results in the progress of children’s mathematics achievement in higher-order mathematics such as word problems and pre-algebra. This suggests that home-based parental involvement and expectations for mathematics are the crucial factors in the early school years. To increase children’s success in mathematics, Vukovic et al. (2013) recommends parents should receive
culturally appropriate training, resources, and support to create home learning environments. Taken together, parents also need additional resources or/and support to help with their children’s mathematics from the early years of schooling that connects to higher-order mathematics in children’s future learning.

**Asian Parents’ Involvement in Education**

Researchers argue that although Asian parents are not actively participating in school-based parental involvement due to respect and trust in the authority of the school, they participate in home-based involvement including managerial involvement and structural involvement (Sy, 2006). For example, Asian parents believe that following what the teacher is doing is showing their respect for their children’s teacher thus parents do not want to bring their opinion to school. Another reason for this is that Asian parents hesitate to jump into school-related activities because of English proficiency and lack of cultural understanding to prepare for school volunteering (Shin, 2009). Instead of direct school participation, Asian parents provide indirect parental involvement at home.

More specifically, Chao (2000) divided home-based parental involvement into two ways: Managerial involvement *versus* structural involvement. Managerial involvement includes direct hands-on parental practices such as directly teaching or tutoring children to enhance basic academic skills. Structural involvement includes indirect parental practices such as providing additional academic practice resources such as workbooks and websites, limiting time to play games or watch tv, and setting time or location to do homework or home study (Sy, 2006).

**Korean Immigrant Parental Involvement in Education.** This section highlights that Korean immigrant parents eagerly support their children’s education at home. Y. Kim et al. (2018) insist that Korean immigrant parents have provided three forms of home involvement
among their participants: (a) support for non-academic development (31.9%), (b) support of emotional/psychological development (29.1%), and (c) support of academic success in general (7.8%) (p. 132). Non-academic development includes “being advisors, supporting children’s interests, guiding character development, having conversations with their children, and paying attention to their children’s peer relations. Emotional/psychological development includes “paying attention to the children and providing love, encouragement, self-esteem, and understanding.” Lastly, the support for academic success, in general, includes “parents’ actions supporting their children’s cognitive development by providing private tutoring, encouraging independent learning skills, reading together, searching for educational information, and creating a supportive environment at home” (Y. Kim et al., 2018, p. 132). Although the study of Y. Kim et al. (2018) revealed only 7.8 percent of parents provide academic support at home, still how parents interact with their children’s mathematical progress is not specifically addressed in their literature. Thus, this study narrowed down on looking at academic support at home, especially in mathematics learning.

Another recent study reveals how Korean immigrant parents of children with autism position themselves in physical education by employing positioning theory (S. H. Lee et al., 2020). Although its discipline is not the same as this study, S. H. Lee et al. (2020) focus on the specific subject of physical education for Korean immigrant parents. S. H. Lee et al. (2020) hired five South Korean immigrant parents as participants, but the differences are the participants have children with Autism Spectrum Disorder (ASD) and the discipline area is the physical education area. Their data sources came from interviews, educational documents, and the researcher’s field notes. I liked how they analyzed the data using a thematic analysis of four themes: (a) role as a parent, (b) cross-cultural educational contexts, (c) the supportive roles of the church, and (e)
underdeveloped partnerships. I adopt this approach in my data collection and ask about the role as a parent, cross-cultural educational contexts, and other supportive community resources (e.g. Korean church in the local area, or online community). Since the parents of immigrant students could experience cultural and language differences when working with school personnel and the community, they might need additional support from their local community or online community.

**Korean Immigrant Parental Involvement in Mathematics Education.** Korean parents particularly are well known to support their children. When they immigrated to the U.S., some Korean parents put their top priority on their children’s educational successes due to their cultural background and the competitive atmosphere in South Korea (H. Kim, 2019). Korean immigrant parents see education as the way to achieve social mobility as a minority population in the U.S. society, and mathematics is the key component to achieving this (H. Kim, 2019).

Conversely, Korean immigrant parents also face difficulties in lack of English proficiency when they support their children’s academic progress (E. Kim, 2002) since parents are not familiar with the U.S. curriculum and contents’ jargon. For example, in terms of mathematics education, Korean immigrant families find differences in the U.S. mathematics curriculum that include cultural, historical, and political contexts, different learning styles, contents, mathematical word problems, and so on. These could be barriers for Korean immigrant mathematics learners and their parents. If teachers are not fully implementing culturally relevant pedagogy, there could be not enough support for the Korean Immigrant students since Korean immigrant students are not inherently good at mathematics (Trytten, Lowe, & Walden, 2012).

However, there has been scarce attention to interactions between Korean-born parents and their American-born children (H. Kim, 2019): How they exchange their mathematical ideas
or build up mathematical meanings at home. This study uncovers 1) the interaction between Korean parents and their elementary-aged children when Korean parents eagerly provide mathematics support, and 2) their narratives about the reasoning for providing direct mathematical support at home during the pandemic Early parental involvement is a crucial period to assure mathematical progress (Vukovic et al., 2013). By listening to Korean immigrant parents’ voices, this study helps to understand how and why Korean immigrant parents adjust or transition from their previous learning in mathematics or cultural experiences of mathematics from Korea when they support their children in the U.S.

The COVID-19 Pandemic and Remote Schooling

The fourth theme in the review of literature is the Coronavirus Disease 2019 (The COVID-19) (CDC, 2020) and remote schooling to avoid spreading the infection. After the coronavirus spread worldwide, people in the U.S. were guided by state orders to ‘Stay at home’ in the spring of 2020. Accordingly, school districts provided online schooling instead of offline classes in the spring of 2020 (Garbe et al., 2020). Due to the concerns about child health and safety, some parents preferred to let children take a virtual hybrid instructional format than the traditional face-to-face format (Limbers, 2021).

During the pandemic, parents take the main role in supervising children’s academic progress including logging in zoom calls, checking school assignments, and monitoring their children’s understanding of the school subjects in addition to their primary duty including work schedules or house chores (Garbe et al., 2020). Also, when parents monitor their children’s understanding of school subjects, some parents do not have a specialty in the school subjects and curriculum compared to their children’s teachers. These influence both the parents' support and their children’s learning.
Likewise, children also have a hard time focusing on schoolwork online. Although children were good at managing their school assignments and school tasks before the pandemic, online learning is not a familiar platform compared to face-to-face learning. Especially, motivating children to keep working on learning through an online atmosphere is hard due to distractions (Garbe et al., 2020). Admittedly, parents also take responsibility in terms of behavioral management including avoiding distractions and giving attention to teachers’ directions. Furthermore, compared to attending schools, students with disabilities are having less physical face-to-face support from school because of remote schooling, and this becomes parents’ responsibility during the pandemic. The special educator also questions himself, “Am I doing enough?” (Schuck, & Lambert, 2020, p. 10) while providing online support for students with special needs under pandemic. Although online provides an alternative way of delivering educational support, some students’ educational needs are not fully covered by online platforms. Lacking physical face-to-face educational support yields negative news in education worldwide. In Korea, a mother and her child with autism spectrum disorder committed suicide during the COVID-19 pandemic without enough physical support from school (Korean Broadcasting System, 2020).

Taken together, parents are not always ironmen, they are also vulnerable figures both physically and emotionally. For example, the pandemic exacerbates conflicts in parental relationships including parents “leaving the workforce, beginning use of antidepressants, or ignoring their concerns about the COVID-19” (Calarco et al., 2020, p. 1). Parents should provide additional care 24/7 to their children at home, but it is hectic.
Theoretical Framework

People desire to belong where they are located, and/or are mentally bonded. From a younger age, children learn the “fear of exclusion” (Yuval-Davis, 2006, p.198). The discourse about attachment and belonging is extensive in education. From infancy, human beings desire to gain enough attention for themselves to receive care for survival (Noddings, 2012). Emotional attachment is a factor in shaping a sense of belonging in a family, a school, or even in a community. At schools, students want to be attached to others and desire to belong as capable figures.

Korean immigrant parents desire to belong in the United States while supporting their children’s mathematics learning. While employing the theory of belonging, model minority stereotypes, and meaning-making, this study examines how and why Korean immigrant parents support their children’s mathematics learning at home while overcoming difficulties and differences related to language, culture, and curriculum. Korean immigrant people also desire to belong in a new location and social community. The children of immigrant families want to feel a sense of belonging to their school and their peers by navigating many differences in the new country (Rumbaut, 2005). Likewise, in mathematics classes, children of an immigrant families try to be included by focusing on studying mathematics (Gorgorió et al., 2002). To closely look at Korean immigrant parents and their children’s mathematical meaning-making at home and their reasoning of providing those support at home, in this part of the theoretical framework, I investigate the theory of belonging, the model minority stereotypes, and meaning-making.

Belonging

A Sense of Belonging
Research on belonging in higher education most prevalently focuses on the “sense of belonging” seen as "acquiring a feeling of being part of a specific academic community" (Trujillo & Tanner, 2014). Alternatively, a "sense of belonging involves one’s personal belief that one is an accepted member of an academic community whose presence and contributions are valued" (Good et al., 2012, p. 711). This can be closely related to Yuval-Davis' (2011) three domains of belonging that stress how people are valued (the third domain) in a society and a personal belief that one is accepted (the second domain-emotional attachment) in an academic community (a community that involves social locations-the first domain). Trujillo and Tanner (2014) more narrowly define a sense of belonging in an academic context, whereas Yuval-Davis (2011) understand the term in a larger sense of belonging. To delve deeper into Korean immigrant parents' ways of supporting their children’s mathematical meaning-making, this study follows Yuval-Davis's (2011) larger scope of belonging.

**Belonging**

When I arrived in the U.S. in 2015, I was looking forward to working as a graduate assistant at a university. So, I knocked on the door of a professor who supervises assistantships. And, I explained, I am looking for information about assistantship. The professor asked, “When did you come to the U.S.?” I said, “This week.” And, she said, “Get out of here. Learn more English, first. Get out of here.” And, she closed the door and I cried after that. I felt that I was a stranger--a feeling I had never experienced in Korea, which is a racially and ethnically homogeneous country. Shifted social locations influence one’s belonging. Based on my personal experiences, there could be other people who have established a new belonging.

In the 16th century, Thomas More imagined a Utopia (Yuval-Davis, 2007), and there are volunteers for a slave who are treated much the same as Utopia citizens however the only
difference is they should work harder. And, Yuval-Davis makes an analogy of ‘volunteers for slaves’ as another term for the nowadays working-class foreigner in the U.S. who should work in harsh conditions or work in not historically prestigious careers. It would be difficult for them to feel a sense of belonging as “a working-class foreigner. Yuval-Davis criticizes the lack of care and how this weakens immigrants’ belonging (Yuval-Davis, 2007). To have a comfortable feeling like being at home in the new country, they should feel they are cared for by the whole community.

In these post-9/11 times, ‘strangers’ are seen not only as a threat to the cohesion of the political and cultural community but also as potential terrorists (Yuval-Davis, 2011). In the COVID-19 era, Asians are seen not only as virus spreaders in the community but also as potential threats to ruin society. Although he canceled his order due to several lawsuits, President Trump once announced the discontinuation of international students’ visas when those students take only online classes in the United States (Jordan & Hartocollis, 2020). Under these circumstances, how could international people in the U.S. feel safe at home? Also, how do immigrant students deal with situations of discrimination? In this section, I discuss the meaning of belonging, and how this study deals with the concept of belonging by building on scholars’ discussions of belonging.

I follow Yuval-Davis’ (2006) definition of belonging as “emotional attachment about feeling at home and feeling safe” (p.197). Because he discusses the different social location and emotional responses of people who came from other national origins that allow looking at the immigrant population that fit into the aim of this study. Yuval-Davis (2006) asserts belonging has three domains; the first is social locations; the second is identifications and emotional attachments; the last is ethical and political values. First, the social location is constructed with
multiple types of differences, such as “gender, class, race and ethnicity, stage in the life cycle, sexuality, ability and so on” (Yuval-Davis, 2006, p. 200). Also, the intersecting social divisions constitute each other and do not have separate meanings for each category. The second, identities are narratives—not only cognitive stories but also reflecting an emotional desire for attachments, these factors are intertwined with the social locations. Lastly, previous factors of social locations and identities, and attachments go together with ethical and political values as a form of how people are valued and judged in society. According to Yuval-Davis, all these factors shape and delineate an individual’s belonging.

**Social Locations.** The first domain of social location is when people say they belong to a particular “Sex, race, class or nation, a particular age group, kinship group or a certain profession” (Yuval-Davis, 2011, p.12). Those social locations are related to “each historical moment while carrying particular weights in the grids of power relations operating in their society” (Yuval-Davis, 2011, p.13). This means that one person takes part in various social locations—a person resides in intersectional social locations. For example, there could be intersectionality across various social divisions like a person can be a man, a woman, or a non-binary individual; Asian, Black, White, or Latin@; working-class or middle class; teenage, middle adulthood, middle-age, and so on. According to Yuval-Davis, social locations have different contextual meanings based on power hierarchies — social locations can be higher or lower than each other. Thus, it is important to understand that social locations are constructed from various power structures.

Korean immigrant parents experience changes in social locations. While they locate themselves in a different society in the new country, they can experience a lack of belonging, and not feel comfortable at home. According to M. Lim (2009), Korean immigrant parents are
reluctant to participate in school-related activities because of the language and cultural differences. They position themselves as an immigrant and minority population and rather prefer to provide a home-based parental involvement (M. Lim, 2009; M. Lim, 2012). However, Korean immigrant parents also may find difficulties in home-based parental involvement in children’s mathematics learning with regard to cultural differences and language that has different grammar and order of logic.

**Identifications and Emotional Attachment.** The second domain is the identification and emotional attachment. That is about “stories people tell themselves and others about who they are (and who they are not)” (Yuval-Davis, 2011, p.14). The identities are both individual and collective, the stories are delivered next to each other and across generations. The stories are revisited and reconstructed having intersectionality of social locations. According to Yuval-Davis (2011), the boundaries that make a distinction between ‘me’ and ‘not-me’ are shifted and challenged by “power positionality, normative values of the social actors, and people’s cognitive and emotional identifications” (Yuval-Davis, 2011, p.17-18).

Korean immigrant parents’ identity is shifted but having similarities within the group, due to their previous experiences and putting top priority on education is referred to as “education fever” (Seth, 2006, p.1). Although they believe education is an important part of their family, there are difficulties in the new country. Since Korean immigrant parents’ learned curriculum is different from the U.S. curriculum of their children, they can experience difficulties in supporting their children’s learning. Emotionally attached to the previous culture of putting a higher priority on education, Korean immigrant parents can try to overcome the hardships of lack of belonging while supporting their children, especially for the children’s future belonging in the major society in the U.S.
**Ethical and Political Values.** Last but not least, belonging is constructed by “how people are assessed and valued by the self and others” (Yuval-Davis, 2011, p.18) and Yuval-Davis categorized them in the last domain of belonging as Ethical and political value. Some people might put their priority on how they are seen by others. Asian people are viewed as a model minority (Shah, 2019), their way of thinking can become a label for them to be valued and judged by the self and others. Although this could work as either a positive or a negative way to build their identity, Asian immigrant people will be influenced by the racial lens toward them. The distinguishing image can weaken the belonging of the Asian population. Furthermore, the belief that ‘Asians are good at mathematics’ is a racial lens linking Asian and an academic subject. However, that cannot truly capture individual variances, and that might be an identity threat to both children and their parents when they support their children’s learning. Similarly, Asian parents are viewed as ‘tiger parents’ because they eagerly supervise their children’s learning, but these views also marginalize Asian parents as a unique group of people. These can also exacerbate the challenges of belonging for the Asian population in U.S. society.

**Model Minority Stereotypes (MMS) and Perpetual Foreigner Stereotypes (PFS)**

Perpetual Foreigner (PF) is also called Forever Foreigner (Ng et al., 2007; Tuan, 1998). Perpetual foreigner stereotypes (PFS) mean Asian Americans are always seen as different in the White Anglo-Saxon dominant society (Huynh et al., 2011). According to Huynh et al., (2011), a person aware of the perpetual foreigner stereotype is more likely to have identity conflict and a lower sense of belonging.

However, Ng et al. (2007) asserted that Asian Americans were invisible and voice out for a society, so there has been less research attention on them. However, 40 percent of Asian
American students entered the community college, although people had an image of elite Asians (Lew et al., 2005). Lew et al. addressed that Asian Americans are an overlooked minority because of the model minority stereotypes. For example, support from community colleges was not given priority for receiving programs and services to Asian American students because they are viewed as an advantaged group, and there has been less research attention on addressing support for Asian American students (Lew et al., 2005).

To explore and understand Korean immigrants’ voices, this study takes up the model minority stereotypes (MMS) (Wing, 2007). This would be helpful to reveal how they perceive themselves who live in the United States including social, academic, and economic perspectives. The model minority stereotype (MMS) sometimes gives people to assume that they can successfully assimilate into U.S. society since they are “hard-working, intelligent, attain higher education degrees, and achieve success in economic ways by overcoming the challenges of discrimination and recent immigration” (Trytten, Lowe, & Walden, 2012). According to Wing (2007), the following are the primary model minority stereotypes (p. 462):

1. All Asian students are high academic achievers. As a group, they outperform white students.
2. Asians naturally excel at math.
3. All Asian families highly value education.
4. All Asians are alike in culture, language, appearance, and academic achievement.
5. Asians do not suffer racial discrimination like other people of color.

However, these assumptions are usually incorrect. This review of the literature reveals stereotypes are myths. Such model minority stereotypes are prevalent as microaggressions. I introduce the counterargument that Wing’s (2007) Model Minority stereotypes include.
**Not All Asian Students Are High Academic Achievers**

Although the assertion ‘Asian students are high academic achievers’ was one of the prevalent stereotypes toward Asian students, S. Lee (1994) insists that not all Asian students are academically successful and uncovers the stories behind the model-minority stereotypes. In her study, a student, Ming, had academic difficulty with several subjects including government, English, and physics. He did not participate in the group tutoring sessions. Nor did he ask his teachers for help. Ming confessed he kept those problems a secret and could not seek any help because he was afraid of being seen as a troublemaker by his family. Likewise, Oyserman and Sakamoto (1997) also discuss having a model minority label as a barrier for students to succeed. They are less likely to see structural disadvantages, blame students themselves for failures, and increase the risk of negative mental health outcomes. Taken together, these two examples are compelling stories to reassure not all Asian students are high academic achievers, rather stereotypes make them conceal academic problems and even make the situation worse.

**Asians Do Not Naturally Excel at Math**

Asians are not any better at mathematics than their other colleagues. Trytten, Lowe, and Walden (2012) report that the academic record of Asian American participants was not significantly different from participants in other racial groups by using a mixed-methods approach including analysis of academic transcript data, surveys, and semi-structured interviews. Trytten, Lowe, and Walden (2012) assert that the matter of academic record is not based on their race, rather it comes from when they try their best and build a hardworking identity by themselves. For example, some Asian American students shared their positive aspects of the stereotype by accepting the “Hardworking” stereotype for themselves, and “being hardworking is now part of their identity” (Trytten, Lowe, & Walden, 2012, p.451).
Sometimes, this ‘Asians are good at mathematics’ stereotype is injurious to the students themselves. According to S. Lee (1994), some students who are not good at mathematics reveal uncomfortable feelings of being seen as abnormal Asians that they do not fit in the category of mathematically capable Asians. S. Lee (1994) reports one student criticized prevalent stereotypes, “Asians didn’t have to work for [math]. . . They’re just made that way” (p. 426). However, this assumption is problematic and might be a way of neglecting Asians’ efforts in mathematics. For example, if an Asian student shows outstanding mathematical performances, with the lens of ‘Asians are good at mathematics,’ colleagues or teachers might evaluate the results as taken for granted, not seeing their effort to achieve their outcomes.

Likewise, Nasir and Shah (2011) assert that the narrative of “Asians are good at math” is a problematic stereotype. Even a student who is good at math in a study by Nasir and Shah (2011) confessed that he is being looked as like, “You might have some Asian in you” (p. 38). Under this “Asians are good at math” narratives, students might experience emotional barriers or negotiation with racial backgrounds, and some students could develop an attitude of pushing back on mathematics. This is not a peaceful and safe learning atmosphere, rather this is a shocking and mocking way of treating other people. In recent research, Shah (2019) argues the “Asians are good at math” narrative becomes a threat to Asian students’ personhood. By pointing to U.S. history, Shah asserts Asians are dehumanized by being positioned as excessively intelligent and looked at as over-evolved figures, not appropriately evolved. After the 1965 immigration Act admitted Asians to the U.S., elite Asians came to the U.S. to achieve higher education degrees and gained economic success, this is providing the foundation of the model minority stereotype (Shah, 2019). The “Asians are good at math” narrative is a socio-political device to understand Asian people as sub persons. The socio-political device works with the
White Supremacy logic, “Asians are “good” minorities because they don’t cause trouble—why can’t you be more like them?” (Shah, 2019, p. 669), however, being a “model” only elevates them relative to non-Asian people of color, Asians remain subordinate relative to White people (Kim, 1999; as cited in Shah, 2019). Researchers need to recognize that there is no single Asian experience (Shah, 2019).

**Not All Asian Families Highly Value Education**

It is a misnomer that all Asian families value education more than others. But, for some Asian cultures, it is worthwhile to see how the idea of philosophy such as Confucianism guided families to put their priority on education (Barringer et al., 1993; Jimenez & Horowitz, 2013; Liu & Xie, 2016; Nagasawa & Espinosa, 1992; Schneider & Lee, 1990; Stevenson & Stigler, 1992). For example, some East Asian countries have Confucianism in which education is their priority. In Confucianism, there are five basic virtues that one has to pursue: Ren (仁, benevolence), Yi (義, integrity, uprightness), Li (禮, rite, and propriety), Chi (智, moral understanding), and Shin (信, trust) (Park, 2007). The fourth term, chi, is related to education and learning. Another possible reason for Asian Americans' educational outcomes is that a strong belief in education will be the key factor in achieving social mobility (Sy, 2006).

According to Sy (2006), some Asian American parents have a cultural value of respecting authority that has been examined in several Asian groups, including Chinese, Japanese, Korean, and Vietnamese. The history of the valuing education system in some Asian countries is not always representative of all Asian families. Because not all Asian countries and families share the same philosophies or cultural backgrounds. Thus, narrowing down certain regional areas by providing one national origin immigrant population can be beneficial to discussing and understanding different Asian populations. Here, my study addresses the Korean immigrant
population’s narratives about how and why they support their children’s mathematical meaning-making at home during the COVID-19 pandemic.

**Not All Asians Are Alike in Culture, Language, Appearance, and Academic Achievement**

There is no single Asian identity or culture. In Asia, there are many different countries, languages, appearances, and cultures. In terms of culture, Asia has several cultural regions: East Asia, South Asia, Southeast Asia, Western Asia, and Central Asia. Since there are various countries across regions, their culture developed in different ways even physically close countries have different cultures. For example, Koreans believe their culture is different from the Japanese. Also, Asians speak different languages. Koreans speak Korean, and Japanese speak Japanese. They do not speak the same language.

Asians do not believe they look alike. As a Korean researcher who is living in the United States, I was asked based on my appearance, “Are you Chinese?” or “Are you Japanese?”, at the clinic while requesting interpreting service, “Your language will be Hmong?” Sometimes, I hear “Xièxie (Thank you in Chinese)” at a store. I feel not comfortable and think about how I should respond. From the above examples, I think that Americans cannot distinguish people from different Asian backgrounds. However, most of the time, Asians could distinguish national origins when they see other Asians. For example, Koreans figure out when they see Korean, Japanese, and Chinese. Likewise, Park (2011b) brings an example story of his participant Hyunwoo that Asians do not believe that they have common things. “I’m Asian? I never thought that I had anything in common with other Asians. I mean we don’t even look alike [he went on to talk about his stereotypes about the physical features of different Asian people]” As Park (2011b) discussed, Asians believe they are not identical people since the people in Asia include various populations. Regarding academic achievement, as this study discussed above, not all Asians are
academically good, there are various realms of academic achievement in Asians (Lee, 1994; Shah, 2019).

**Asians Do Suffer Racial Discrimination Like Other People of Color**

The COVID-19 pandemic has amplified the Anti-Asian stereotypes even more (Misra et al., 2020). Admittedly, the COVID-19 pandemic changed people’s way of thinking toward contact with each other, for example, due to the way of virus exposure, people do not want to contact each other, including in the states, and nations, and across the border. Amid the COVID-19, for some people, Asians are viewed as ‘Virus spreaders’ who are more likely to deliver coronavirus (Misra et al., 2020). With this phenomenon, there is a feeling of phobia toward Asians whether they came from China, Korea, Japan, Vietnam, and so on. There have been several attacks on Asians, including Korean. For example, one newspaper reported that a Korean college student was attacked without any reason, and she heard before the attack “You’ve got coronavirus” in Manhattan in March 2020 (Griffith, 2020). Likewise, a 62-year-old Korean man was attacked and bloodied after he was pushed from behind without reason other than his racial appearance as Asian, when he was waiting for a bus in Rialto, California in June 2020 (Casino, 2020). People are afraid of people from other countries, or people from Asia. Not surprisingly, anti-Asian racism is not a new trend; rather it started more than several decades ago. After World War II, yellow peril was a prevalent fear toward Asians in the U.S., according to Shah (2019).

Another form of anti-Asian racism is represented in the form of microaggressions. According to Forrest-Bank and Jenson (2015), microaggressions are a form of discrimination characterized by subtle and often unintentional acts of discriminatory behavior. The microaggressions yield detrimental effects on the psychological and emotional well-being of non-White individuals. In the late 20th century, Asian American children were bullied by
listening to, "Chinese, Japanese, dirty knees, look at this" which is a racist playground chant in English-speaking countries. Ong et al. (2013) report that 78 percent of Asian American participants experience daily exposure to microaggressions for two weeks in their study. Examples of microaggressions are customer service, asking national origin questions, listening to Asians all look alike, and so on. Likewise, Sue et al. (2007) find Asian Americans feel that they are left out when racial issues are discussed. For instance, one Chinese American female stated in Sue et al.’s research, “Like even most race dialogues are like very Black and White-. . .like sometimes I feel like there’s a lot of talk about Black and White, and there’s a huge Asian population here and where do we fit into that?” Besides, Sue et al. (2007) points out that assumptions toward Asians who might experience little, or no discrimination creates a phenomenon that their racial concerns are not importantly dealt with. Asian participants in the study of Sue et al. (2007) confess they feel that they are considered like Whites, but never fully accepted by their White peers. Taken together, Asians do suffer racial discrimination in both physical and mental ways.

Tiger Mothers Are Not All Asian Mothers

Asian American parents’ involvement in education is viewed as controversial after Chua (2011) published the book Battle Hymn of the Tiger Mother. Although strict ways of parenting might yield a successful outcome like sending their children to Harvard, it is obvious that every child is different to accept a way of parenting because some children might rebel against their parenting approach. After that, there are prevalent stereotypes toward Asian parents that they are all tiger mothers (fathers). There could be, but not all Asian mothers are tiger mothers. Of course, there could be a tiger mother who is White, Latin@, African American, or any other population.

Korean immigrant parents try to support their children academically by direct way of
home instructions or hiring additional human resources such as tutors or online tutoring. Sometimes, Korean immigrant parents employ math tutors during summer vacation while they visit Korea, and sometimes they send their children to cram schools. To give their social capital to their children, parents try to send their children to a famous or top-tier university although they should spend a huge amount on private tutoring costs (S. Park et al., 2015).

**Perpetual Foreigner Stereotypes**

The perpetual foreigner stereotype is that some minority populations are perceived as foreigners when their appearances are different from European Americans (Huynh et al., 2011). Asking for national origin is one of the moments that trigger perpetual foreigner realization of the person who is asked (Tanaka & Neptune, 2013).

Asian Americans are one of the vividly treated groups of people being seen as the perpetual foreigner stereotype as an alien in one’s own land with feelings of “inferiority, discomfort, and isolation” (Huynh et al., 2011). Being a perpetual foreigner is connected to threatening individuals’ sense of belonging (Huynh et al., 2011).

**Meaning-Making**

The last component of the theoretical framework in this study is the theory of meaning-making since this study sees the Korean immigrant parents and their children’s mathematical meaning-making moments through observations. Thus, this study employs a lens of meaning-making to interpret how their interactions prop up mathematical meaning although having language and cultural barriers. This part includes: meaning-making in education, meaning-making in mathematics, and meaning-making and bilingualism among immigrants as a lens to see Korean immigrant families.

to “meaning-making” as a theoretical framework. He employs “constructive developmental” psychology as the study of the development of construing or meaning-making activity that gives integrative capability (Ignelzi, 2000, p. 5). Meaning-making is a key element in understanding concepts in various subjects as a lifelong learning process (Kegan, 1980). The process of learning and teaching is influenced by the ways participants make meaning of themselves. New experiences are interpreted through an individual’s current construction of reality. This means if a person sees new or more complicated experiences, they build up and refer to their understanding from previous experiences to make sense of it. For example, when my two years old daughter saw falling water from the sky, I taught her it was “rain”. Then, when she saw falling snowflakes from the sky, she asked “rain?” based on her previous experiences of something that falls from the sky like rain, but I taught her “snow”. She added another concept “snow” which also falls from the sky, but white flakes distinguish it from rain which is liquid. Thus, meaning is created between the event and the person’s interpretation of it. The meaning-making can be a shifting or even challenging moment compared to a previously known world.

Meaning-making can happen with support from others. Ignelzi (2000) admits that supporting someone’s development requires comprehending and valuing how the other person currently understands their experiences. Kegan (1994) asserts that educators must think about how to build a developmental bridge between current meaning-making and a more complex way (Ignelzi, 2000). In this study, the parent(s) takes responsibility for a developmental bridge for children’s mathematical meaning-making.

**Meaning-Making in Mathematics Learning**

“Meaning is inherently unstable” (Andrews, 2014, p. 3). That is, the meaning is constantly shifting in oneself and/or with others. Similarly, mathematical meaning is shaped and
reshaped by experiences, interactions, daydreams, inspirations, and so on. Most of the time, home-based mathematical meaning-making occurs between children and parents. According to Lakoff and Nunez (2000), mathematical ideas are grounded in daily experiences. Likewise, Redish and Gupta (2009) assert that complex ideas and mathematical formulas are embedded in human beings. Mathematics happens at home during the COVID-19 pandemic. Thus, this study focuses on parents’ and their children’s narratives either individually or collectively.

According to Schoenfeld (1994), “large amounts of mathematics can be learned as sensible answers to sensible questions—that is, as part of mathematical sense-making, rather than by ‘mastery’ of bits and pieces of knowledge” (Pitvorec, 2016, p. 20). Likewise, van Oers (1996) suggests students should pursue making sense of mathematics based on their experiences in the world. Accordingly, Pitvorec (2016) asserts that the “pursuit of learning new mathematical concepts becomes a meaning-making activity” (p. 20).

In meaning-making in mathematics, there are two kinds of meaning: cultural meaning and personal meaning (van Oers, 1996). Cultural meaning in mathematics is referred to as “knowledge, skills, ways of talking, and ways of acting that are needed to be successful in the community” (Pitvorec, p.21), and personal meaning in mathematics is referred to as “the process of attaching personal value to actions and goals in the mathematical activity” (p.21). According to Pitvorec (2016), cultural meaning and personal meaning must be intermingled together to make authentic meaning.

The mathematical meaning-making process is referred to as “actions become associated with symbols including language, representations, and gestures” (Bruner, 1990; Pitvorec, 2016; van Oers, 1996). This study employs the theory of Pitvorec’s (2016) “mathematical meaning-making”, to interpret Korean immigrant parents and their children’s communication with
mathematical meaning while they integrate personal value into actions and goals in the United States mathematics.

**Meaning-Making and Bilingualism**

According to Ortega (2014), children who learn two languages simultaneously are called bilingual children. However, if a child goes to a one-language school in addition to their home language with their parents, one of two languages becomes a second language (L2). For example, if Korean immigrants go to a U.S. public school, they mainly use or are exposed to English at a school, but they still could speak Korean at home.

According to Moschkovich (2007), bilingual students could use two languages and change language according to their different needs. Changing two or more languages during conversation is called code-switching (Moschkovich, 2007). Moschkovich (2007) distinguishes code-switching and language-switching. While code-switching happens in a conversation, language-switching happens in one’s brain when a person thinks of a concept in their preferred language and speaks in another language. For example, Moschkovich (2007) explains this in her own experiences of language-switching, “Spanish is my first language and I learned mathematics through the 7th grade in Spanish. I carry out addition and multiplication of whole numbers in Spanish (either “in my head” or in a mumbled whisper) (p. 126). For example, in terms of language switching in Korean students, an individual could think of a mathematical equation or formula in their brain of the first preferred language such as Korean, and then express it in the second language like English. However, code-switching happens during the conversation. Moschkovich (2007) asserts that code-switching referred to as using two languages in explaining mathematics concepts can provide resources such as opening multiple ways to participate in mathematical discourse practices. Likewise, J. Kang (2012) shows that being bilingual has a
beneficial effect on being aware of different sounds between Korean and English languages. About code-switching in a conversation of Korean families, Korean 2nd generations who speak Korean at home with their parents are encouraged by parents who speak more Korean at home (but are good at mathematics) sometimes they might explain mathematical concepts in English and (or) Korean, the conversation might include shifting moments of either language. Thus, when children are supported in mathematics, they might have that code-switching in conversation with their Korean parents while they learn mathematics. In this study, the observation of the interaction between a parent and a child can be interpreted as they change the language while having difficulties or differences in learning mathematics.

**Methodology**

**My Narratives**

One important thing about this study is my positionality as a researcher. My racial identity and cultural background led me to investigate Korean immigrant parents of elementary-aged children. I used to be an elementary school teacher for about six years in an urban area in South Korea. My elementary school teaching experiences guided me to include elementary students as my research subjects in this study.

At the beginning of the writing procedure for the dissertation proposal as a Ph.D. student, as a Korean immigrant, I hesitated to uncover my story and Korean immigrants’ stories concerning the audience. My inner voice said, “Maybe, nobody wants to listen to my dissertation. Who cares about listening to the minor population of Korean stories?” But, I was encouraged by the work of Clandinin (2013). Clandinin (2013) beautifully and successfully revealed her aboriginal background as a researcher in her book. It helped me to understand the
value of all stories. Clandinin (2013) addresses the importance of sharing stories because it allows people can respect others’ experiences and learning happens from each other.

I am a Korean immigrant mother who has two young children who were born in the U.S. For your information on my background, my father was born in a small agricultural family in 1951 during the Korean War. He graduated from a four-year university and became a government official. My mother was born in a big agricultural family in 1957 and graduated from junior high school. Then, her parents (my grandparents on my mother’s side) passed away due to aging. And, her oldest brother who was 20 years older than my mother was granted almost all of the family property, mostly huge land including the suburb area of Seoul (Which is currently about 100 million dollars). But, unfortunately, daughters could not inherit their parents’ property commonly in those days (Although the law said women can receive ½ of the amount of the male siblings, my mother was still a teenager, and it was hard to prepare for a lawsuit). And, my mother’s older brother’s wife (sister-in-law) took the duty of primary caregiver for my mother and mother’s younger sister. And, the sister-in-law did not let my mother go to high school to save tuition and recommended working on the family farm. My mother desired to learn more, and she dreamed of becoming a writer. But, it became impossible with limited education due to family members’ control. After several years, when my mother became 18, she came to the city and was hired as a factory worker then promoted to a working group leader at LG. My father and my mother were introduced and married. And, my mother quit her job and became a homemaker for caring for her two adorable children. And, I was born in 1985. When I was young, studying hard was believed as a virtue to climb the ladder of success in Korean society. I heard these kinds of words from my father and teachers, “If you study hard, you will have more chances to succeed in your life.” And, I think this still applies to many students in Korea.
Conversely, my mother reminded me that educational attainment does not always match up with the level of happiness, rather she taught me her desire to learn, not just focusing on its result, the desire and progress during the path are meaningful. Thus, why I studied hard as I have enjoyed challenging myself and have appreciated learning.

After entering university, I began to dream about studying abroad by taking various courses in the first year of university. I admired professors and enjoyed listening to their learning path as a scholar. Compared to high school learning including memorization in textbooks, university classes encouraged students to discuss, write papers, prepare presentations and share question and answer sessions. I loved all these new styles of learning. During my 3rd year of university, I applied and was chosen as a student who can study in Japan for a year, and during that period, I could learn Japanese and made a lot of Japanese friends. And, I passed the highest level of the Japanese fluency test (JLPT Level 1). After coming back from Japan, I prepared to pass the teacher competition exam to have practical experience as a teacher. I became an elementary teacher in a public school as a government officer. I worked for about 6 years in addition to receiving my first master’s degree in Korea. As I wrote my first thesis, I felt I wanted to learn more from a bigger research world, such as the U.S. I wished to become a good scholar in mathematics education. Then, I applied to a master's program at St. Cloud State University in the U.S, and after finishing that I was admitted to a doctoral program at the University of Wisconsin-Madison.

For my own family, I married in 2015 before coming to the U.S. But, my husband began his duty as a Korean army officer (ROTC) in 2015, ended in 2017, then he flew to the U.S. to study and live with me. I have two adorable children: the first daughter was born in 2018, and the second daughter was born in 2020. Since my children were born in the U.S. they are dual citizens
of Korea and the U.S. although my husband and I are holding student F1 visas. And, now I am writing this dissertation while trying to make a balance between studying and caring for children. Although I have lived in the U.S since 2015, I am still in the middle of assimilation into the U.S. culture. I keep working on my acculturation, English fluency, and so on.

This gives reason to listen to Korean immigrant parents who desire to belong and support their children’s mathematics education. Also, elementary-level teaching experiences were shaped to include grade 3 through 5 students’ parents in this study. Accordingly, my “practical justification” (Clandinin, 2013, p.36) for this study is to find meaningful attest of practice at home and how parents make assets by doing this by exploring other parents’ lives and inquiries. In this study, the research puzzles (Clandinin, 2013) which are research questions are the story of Korean immigrant parents and their children’s mathematical meaning-making at home during the COVID-19 pandemic.

The reason for asking the research question is that I want to study the stories of Korean immigrant parents who came to the U.S. but still working on their acculturation in a new country. They keep their national heritage and raise their children. I feel they are all in the same boat as me. As an immigrant mother, I sometimes feel I am not a “cool mom who knows about the U.S. culture” due to cultural differences. For example, on Valentine’s day, I thought it was the day to celebrate only couples. But, my daughter’s friends brought presents for the daycare friends such as small toys. I felt that I missed some special opportunity to teach her to share and celebrate a memorable day. And, bilingual acquisition is another hurdle for my children. I speak Korean at home for my children, and my children are going to an English-speaking daycare center in the U.S. school system. But, the bilingual learners take longer to learn two languages including my daughter. Besides, the pandemic adds another hurdle to extending caring
responsibilities for the children. At the beginning of the COVID-19 pandemic around March-May 2020, daycare centers only opened for the essential workers who serve in the medical area, grocery sectors, and so on. Thus, I could not send my children to the daycare center, and I went through 24/7 care for my child. Although we were happy to stay together, it was not easy to find a balance between study and care. Thus, I thought that other Korean immigrant parents also may experience similar difficulties. With these various difficulties, as a mathematics educator, I want to add their stories and narratives in interaction with their children about mathematics by closely listening and looking at them. This study explores their educational needs, desires, and gaps between current mathematics education in the U.S. And, based on their narratives, this study finds what kinds of educational support can be required for the future.

**Narrative Inquiry**

Riessman (1993) defines narrative inquiry as a type of analysis that “takes as its object of investigation the story itself” (p. 1). Although the narrative is a “first-person account” (Riessman, 1993, p. 1), it does not have to be limited to one person. Instead, it can include collective narratives between people (Capps & Ochs, 1996; Maynes et al., 2008). Listening to Korean immigrant parents' stories provides insight “to seeing into [their] subjective experience—what life ‘means’ to [them] at the moment of telling” (Riessman, 1993, p. 52) including their real world and the wished-for world.

Mainly, two studies by Gomez (2014, 2016) guided this study to deploy the methodology of narrative inquiry to analyze both interviews and observations. Influenced by Bakhtin (1981), Gomez (2014) asserts inductive and deductive methods of analysis (Graue et al., 1998) with a narrative inquiry which is referred to as the ‘bubble-up strategy’. In her later research, Gomez (2016) draws on Bakhtin’s assertion that group discourse shapes one's ways of seeing the world
differently that guides alternative ways of thinking. She listens to two aspiring teachers—one who is a person of color and one who is from an immigrant family—to show their changing ways of thinking while participating in service learning. She selected these participants to obtain narratives that were different from their White and/or nonimmigrant peers.

Likewise, in this study, I use both inductive and deductive lenses on findings from interviews and observations including common themes across data. In interviews, by listening to narratives, this study focuses on parents’ perspectives and difficulties in supporting their children’s mathematics learning at home. In the observation section, this study highlights the interaction between parents and children in both ways of interactions including affirmative actions, sharing mathematical stories or context, approach to error making, and language negotiation including gestures. Listening to others allows finding the reasoning behind a person’s actions including “thoughts, feelings, deeds” (Lachuk, 2016, p.37) that provides the researcher of this study to analyze how Korean immigrant parents support and engage with their children’s mathematical meaning-making.

**Meaning-Making in Narratives**

Bakhtin (1981) guided researchers in education to bring attention to utterances from people. “As a living, socio-ideological concrete thing, as heteroglot opinion, language, for the individual consciousness, lies on the borderline between oneself and the other” (Bakhtin 1981, p. 293-294). Similarly, Holland, Lachicotte, Skinner, and Cain (1998) asserted the figured world in which a person’s identity is shaped by social interactions in the world, taking a study by Bakhtin (1981). The social interactions include speech and other expressive genres of dialects, registers, accents, and so on. Similarly, this study employs mathematical meaning-making referred to as “actions become associated with symbols including language, representations, and gestures”
And, this study settles well with the narrative inquiry by highlighting the parents’ and child’s utterance of idea exchanges including gestures based on observations. Because, between parents and child, the meaning-making may happen during daily at-home learning experiences. Besides, mathematical meaning-making at home can be seen as a "cultural apprenticeship,"—“children and other novices gain the cultural skills and understandings of members of their society” (Capps & Ochs, 1996, p. 145). Thus, by looking at parents’ and children’s collective narratives, this study explores a cultural apprenticeship closely in the meaning-making and children's mathematical skills and understanding at home.

Importantly, narrative inquiry guides the researcher “to see people and their interactions as both individual and social” (Maynes et al., 2008, p. 69) unveiling individual life courses and collective life histories. Collective and individual narratives uncover why people think, and how people make sense of certain mathematical concepts. People create or recreate feelings and meanings based on previous experiences (Maynes et al., 2008). Korean immigrant parents and children’s meaning-making can be aligned with the lens of “synergy” which means a combined effect that happens in “interactions between various forces, particles, elements, substances, parts or individuals in a given context” (Lachuk, 2016, p. 85). Likewise, this study explores the synergy of what happens when Korean immigrant parents support their children’s mathematics: different cultural backgrounds between parents and children, languages, gestures, mathematics contents, word problems, logic, and so on. As Moschkovich (2007) points out, bilingualism can be an asset for the children’s understanding of concepts. This study captures those kinds of interactive synergy by looking at exchanging differences to prop up to children’s meaning-making. Thus, the narrative inquiry is a useful approach since this study also navigates how these
mathematical meanings and perspectives can be built, reconstructed, or revisited during interactions with children and parents at home.

**Narrative of Korean Immigrant Parents**

“Based on our past encounters, we expect certain things from them, now in the present, and this is also the basis upon which we make plans with them, or don’t, for the future” (Andrews, 2014, p. 3-4).

Korean immigrant parents can share their previous experiences, identities, perspectives, or feelings when they support their children’s mathematical meaning-making. Since this study collected data from observations and interviews, listening to Korean immigrant parents’ voices is crucial to understanding their way of thinking when dealing with home-based involvement. As this study discussed in the literature review section, Korean parents face model minority stereotypes. By looking at their emic perspectives, this study may encounter the “unexpected turnings” (Andrews, 2014, p. 30) such as shedding light on minority mothers' way of supporting through their voices. And, this study aims to make the strange familiar to other populations in investigating Korean immigrant parents’ stories. I decipher meanings from Korean immigrant parents' voices. By looking at others, people can understand themselves and can extend their understanding of the “possible way of living” (Andrews, 2014, p.78) of others.

Korean immigrant parents position themselves as multidimensional figures in social locations such as mothers, women, immigrants, Asians, Korean Americans, and so on. Understanding norms and conventions that are intertwined with social expectations is important to understanding one’s decision-making and way of thinking (Maynes, Pierce, & Laslett, 2008). According to Maynes et al. (2008), people make connections among ‘memory, notions of the self, and personal narrative’ (P. 39) as multidimensional combinations. This study captures these
multidimensional characteristics of Korean immigrant parents from the interviews and observations. Furthermore, this study uncovers how the intersection of their positionality influences their ways of supporting their children’s mathematics learning.

**Methods of Data Collection**

This study uses narrative inquiry of interviews and observation. I recruited 5 Korean immigrant families to develop a better sense of understanding of how Korean immigrant parents try to support their children in mathematics learning and their reasons for doing so at home during the COVID-19 pandemic.

**Participants-Korean Parents and Their 1.5 & 2nd Generation Students**

In this study, Korean immigrant parents are 1st generation (1G) who were born in Korea but immigrated to the U.S. during or after the age of 20 and have children who are either 1.5 generations (1.5G) and/or 2nd generations (2G). The 1.5 generation includes those who immigrate to a new country after spending some portion of their childhood in another country (Asher, 2011). They bring with them or maintain characteristics from their home country while engaging in assimilation and socialization with their new country. The term 2nd generation refers to either the children or the grandchildren of immigrants. For example, since I moved to the U.S. after my 20s, if I am a 1G immigrant, and my children are 2G since they were born in the U.S., if I had children before coming to the U.S., they would be 1.5G.

*Inclusion Criteria.* Participants in this study are families that include 1G Korean immigrant parents and their elementary-aged children. At least one of the children should be in grades 3 through 5. All participants are South Korean because of the political limitations on travel for North Korean people. For this study, Korean immigrant families are heterosexual families where both the mother and father are 1G immigrants. To assure that participants have sufficient
experience with U.S. schools, they must currently live in the U.S. and have enrolled at least 1 of their children in school for at least 3 complete school years (this means that they would have experienced at least 1 school year that was uninterrupted by the COVID-19 pandemic). And, since this study aims to see mathematical meaning-making at home, the participating parents must provide direct mathematics support at home. For this study, external tutoring support and support from siblings or other family members do not qualify. Because of the purpose of the research, it is important to study families with elementary school grade children because parents make more decisions and involvement with their children at earlier ages.

For the age group of children, my participants' families have elementary school students. The first reason for this is that I used to be an elementary school teacher, so I understood their mathematical context. And, the second reason is above elementary school students become more independent from their parents, and they find their study routines compared to the younger age groups. My aim for this study is to find parental involvement, so elementary school students are more likely to be supported by their parents.

**Participants Recruitment.** In this study, I recruited 5 families who met the inclusion criteria: 1G parents, 1.5G or 2G elementary grade three through five children and having direct mathematics support at home. I will also use a snowball sampling method that relies on referrals from initial participants who refer to other persons believed to have the characteristic of interest (Johnson, 2014). Because this study has specific inclusion criteria, this study also collects participants from the largest Korean online community in the U.S, “Missy USA (https://missyusa.com)” (Oh, 2016). The users of the website are born in Korea, but they later came to the U.S. or Canada during their 20s or 30s to work, get married, or study (Oh, 2016). According to Oh (2016), most of them are married women (men also can join) and the website
mostly uses the Korean language. The website has several discussion boards: Living Tips, Cooking, Motherhood, Sell & Buy, and so on. Members ask and share their responses on each discussion board anonymously by the rule of the website.

Personally, I have used Missy USA as a tool to connect with other Korean immigrant people in the U.S. When I came to a small college town in the Midwest in 2015, there was less of a Korean population and a less strong community compared to Korea. One of my Korean friends who already lived in the Midwest of the U.S. for almost 20 years recommended me to join Missy USA. Since she already asked various questions including small concerns, tips for buying Korean products, or big issues with culture or children’s schooling. Within one hour or less than 24 hours, I could listen to various Missy’s opinions based on their lived experiences while living in the U.S. I also posted a question about preparing for a doctoral program. Some of the Missy members are professors or wives of professors who responded to me about various programs. Admittedly, some of the answers were not beneficial, but some of the answers were advantageous. Choosing appropriate information is important since every information is anonymously shared, and taking information is up to the individuals.

**How to Recruit People from the Website.** I posted brief flyers (See Appendix A) at Missy USA about the research and its purpose to support Korean Immigrant populations’ mathematics learning at home. In the flyers, I provided my email address for those who might be interested in participating. And, if I receive their interest in the emails, I made a 5-min appointment Zoom call to find whether they are appropriate participants to briefly interview asking for information related to inclusion criteria—about Korean immigrants 1G and sending their children from grade 3 through grade 5 to at least 3 years of American schooling to assure enough schooling related experiences in the U.S. that include before/during the COVID-19
pandemic, and having mathematics support at home. When participants were appropriate, I sent additional consent forms and asked for their schedule for the first interview session on Zoom call.

**Recruiting Process.** The recruiting process was challenging and fit into the recruitment criteria. Not fitting in the recruitment criteria were due to immigrant generations, children’s age groups, and/or existence of direct support. Exclusion examples are here:

1. One or both of the parents are 1.5 gen or 2nd generations--For the aim of the study, this study only includes both parents as 1st generation.
2. The participants' children were in elementary grade 1 or 2 and did not experience at least one whole year that was uninterrupted by the pandemic.--This study includes parents and children who experienced at least three years of schooling (pre-pandemic, mid-pandemic).
3. Did not live in the U.S. recent 3 complete school years (only lived 2 years)
4. Did not directly support mathematics at home--This study aims to see parents and their children’s mathematical meaning-making.

**Two Languages in Interviews and Observations.** Interview questions were provided in either Korean or English or both languages based on the participants’ preferences. At the beginning of the first interview session, I asked about the language preferences of the participants. When the participant required communication in a different language during the interviews, I switched languages as needed. Allowing two languages was one of the basic settings for this study to include their natural interactions. Because the participants were familiar with using the Korean language, or they needed additional English use, for example, when they try to translate English into Korean or Korean to English in terms of explaining their
mathematical ideas and terminology. And, also I think this was helpful to build a rapport with participants. Since the researcher of this study has lived in the U.S. since 2015, the researcher is fully aware that the Korean immigrant population sometimes feels more comfortable with using their home language when they communicate with other Koreans in the U.S. And, the researcher can understand both languages. And, five participants chose to be interviewed in Korean, but they also naturally brought English expressions into their conversation.

The data was collected in interview sessions and observations of parents’ and students’ interactions with mathematics home assignments or worksheets. The consent form and assent forms were provided in both English and Korean languages (See Appendix E). Admittedly, some Korean parents might mix English and Korean when they choose some words or U.S. context things to express. In addition to that, when parents and their children interact with each other, they also could use cross-language, for example, when parents explain to their children’s mathematical concepts, they might translate either English to Korean or Korean to English for support.

The Layout of the Timeline

After receiving approval from the dissertation proposal committee and IRB, I collected data for the dissertation in Summer 2021. Since the participants’ families were 5 families, and interviews and observation sessions took approximately 6 to 8 hours per family, data collection took me at least 150 hours and up to 200 hours. Admittedly, the timeline took more time than expected since their response time varied depending on the person. Also, I considered a possible dropout rate and schedule adjustment.

**IRB-Research Proposal: No In-Person data collection.** Due to the COVID-19 pandemic, this study is not planned to collect data in person based on IRB and Proposal research
guidelines to protect participants from pandemics. The researcher interviewed and observed online. But, if the COVID-19 pandemic is more relaxed and the guidelines allow, I planned to ask parents if they prefer either an in-person setting or an online setting. However, due to the COVID-19 variant including Delta, all data collection was done via Zoom. After receiving approval from the dissertation proposal committees, the researcher submitted the plan to the Institutional Review Board (IRB) at the University of Wisconsin-Madison. And, after receiving approval from the IRB, I collected data from June 2021 to August 2021.

**Data Resources**

**Interviews, Observations, and Artifacts**

This study includes three types of primary data resources: interviews, observation, and artifacts (images of workbooks). Firstly, the interview questions were prepared with interview protocols. Specific interview structures are as below. Each question was discussed in Appendix A, B, and C.

**Interviews**

Based on Glesne’s (2016) suggestions about interviews, the interviews were held three times per family. The first interview aims to listen to the participants’ background experiences and think about themselves and their children—including the demographic questionnaire that has information on age, gender, the grade of children, ethnic background, and time in the U.S. The second interview is based on the first interview but includes mathematical meaning-making and sharing about their supporting experiences. The final session was deep reflective interviews based on two observations with questions (See appendix A, B, and C). This study referred to the prototype questions from Yeh and Inose (2002) but revised its context to the mathematics experiences and parental support. The questions were given in Appendix A, B, and C.

**Interview Structure and Duration.** The length of each interview was around 60 mins to
90-min listen to participants' backgrounds, previous experiences, ways of thinking, ways of supporting, and so on. If the interview took longer than expected, the researcher asked whether the participants extended about 15 min or suggested keeping the conversation later.

<table>
<thead>
<tr>
<th>The order of the data collection-Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview 1</td>
</tr>
<tr>
<td>90 mins</td>
</tr>
</tbody>
</table>

**Purpose of Interview 1.** Knowing parents’ educational backgrounds and experiences, educational expectations, perspectives, language use at home, self-math preferences as a SUPOJA or not, building rapport with parents and knowing their pattern of support.

**Purpose of Interviews 2.** Knowing parents' cultural socialization: Model minority stereotypes, Asians are good at math rhetoric, Tiger Mom, cultural differences, strengths, and difficulties between two different countries.

**Purpose of the Observation 1.** Figuring out a normal pattern of the interaction and way of support pattern of the mathematical tasks at home.

**Purpose of the Observation 2.** Figuring out detailed information on the interaction and way of supporting the pattern of the mathematical tasks at home.

**Purpose of Interview 3.** Knowing mathematical meaning-making, after observing the first and the second interaction, asking additional questions about mathematical meaning-making, and reflection to wrap up the three interviews and two observations. Specifically, the researcher can ask about the interaction.
**Styles of Interviews.** The style of the interview itself was conversational and semi-structured since it is a narrative inquiry approach through participants’ narratives to find several themes based on interviews and observations.

**Before Interviews-Testing Protocol & Providing Interview Questions Ahead of Time.** The interviews were prepared with a testing protocol with Korean friends and Korean peers who are not participating in this study. During the testing interview, I can distinguish if those questions are not needed to be in the interview. Also, I can check to revise the wording and how long the interview takes. If it runs out of time, I can pre-designate the top priority questions which are the most important questions that I should ask first, and I could request additional questions based on the priority for a later time.

To give enough time to contemplate each question, I provided interview questions ahead of time in both the language of Korean and English. Participants could go through the questions before the interview and could prepare how to answer questions.

**During Interviews.** I suggested participants explain their ways of thinking and experiences with examples by giving these probes like “Could you give me an example?” And, I allowed participants enough time to answer each question since I provided questions ahead of time if their answers are long. I followed the priority questions that I ranked before the interviews.

**After Interviews.** The researcher could transcribe the interviews and send the transcripts to the participant whether they want to add, revise or delete them.

**Observations**

Observation sessions were twice that including observation of 40 min and debrief sessions of about 20 mins, resulting in a 1-hour observation each. Observations included an
authentic conversation between Korean immigrant parents and their children about mathematical meaning-making, how to deal with mathematical expressions between two cultures (or translating context and words), Korean parents’ way of supporting, their strengths or struggling, or way of cheering their children, and so on. Debriefing sessions clarified its meaning and ask additional questions to clarify the interactions between parents and children.

**Observation Structure.** Observations were virtual observations with video recordings of parents’ and children’s home mathematics studying or support. The observations were recorded twice to have a better sense of understanding of their type of interactions, and contents. Before the virtual observation with video recording, the researcher received parents’ consent and children’s assent forms before collecting data. The video data represented a phenomenon of parents and children working together to show how parents and children participate, sometimes there could be no talking (silent time) due to working on the tasks. After the observations, in the debriefing session, I checked out with parents or their children by asking what I have heard about their interaction with mathematics content areas or problems to clarify their performance and ways of support.

**Observation Criteria (Focusing on Meaning-Making).** The aim of the observation is how meaning-making happens to overcome cultural barriers (language, culture, curriculum, and the COVID-19 pandemic). The observation session involved the researcher attending (virtually) and observing the support of parents with children and mathematics that they agree on. The observation criteria focused on meaning-making (see appendix D).

**Artifacts-Workbooks, Worksheets, and Any Other Resources**

The last, artifacts were additional resources for the data that can bridge and triangulate between interviews and observations. From the interaction between parents and children, the
artifacts come up with types of using workbooks, worksheets, homework, or any other resources.

**Methods of Data Analysis**

This study examined difficulties, differences, and supporting strategies to help their children’s mathematics among a sample of Korean Immigrant parents of elementary-aged students. The researcher transcribed and analyzed the recordings for each interview and observation. After finishing transcribing, I sent the interview transcripts to the participants to ask whether they want to add more narratives, revise, or delete them.

I transcribed the participants' narratives that have both Korean and English. For most of the interview sessions, participants preferred to use their first language, Korean. According to the majority of the language of the participants, the researcher used an AI (Artificial Intelligence) transcribing online platform: To transcribe Korean majority narratives, I used the ‘Naver Clova’ AI program. Originally, I planned for English majority narratives, I tried to use the ‘Microsoft 365’ transcribing function. However, the language use of data had more Korean language, so this research ended up only using Naver Clova for initial transcribing. In addition, the researcher cross-checked the transcribing and took several repetitive processes to listen to code-switching and retyped whenever the AI technology did not capture the correct narratives.

When a person used code-switching between Korean and English, I translated the interview verbatim into English to help the audience of this study. But, I keep the original transcribed language together with the translation. For example, I transcribed both languages in Korean and English. And, I have translated sentences just below the mixed language lines and the translated parts where italicized fonts are originally Korean.

Then, the data will be interpreted with a ‘bubble-up’ strategy (Gomez, 2014, 2016) of both inductive and deductive procedures with the lens of belonging, model minority stereotypes,
and meaning-making. This is a kind of discovery-oriented exploratory approach by going back and forth between data and categories from the data.

The three initial deductive themes are linked to the theoretical framework in this study: Belonging (Yuval-Davis, 2011) -- Korean immigrant parents’ shifted social locations, their identifications and emotional attachment, and their value by themselves and others; Model minority stereotypes that include Asians do not naturally excel at math, perpetual foreigner, microaggressions, and glass ceiling; Mathematical meaning-making at home--how they interact with the mathematical meaning with symbols, representations, gestures, languages including code-switching, and so on. The three initial deductive themes are not fixed codes, rather it develops during repetitive procedures between both the inductive procedures and deductive procedures.

**Table 1**

*The Initial Deductive Reasoning Themes*

<table>
<thead>
<tr>
<th>Belonging</th>
<th>MMS</th>
<th>Mathematical Meaning-Making</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Social locations</em></td>
<td><em>Asians do (not) good at math</em></td>
<td><em>Language (code-switching)</em></td>
</tr>
<tr>
<td><em>Identification and emotional attachment</em></td>
<td><em>Microaggressions</em></td>
<td><em>Symbols (math symbols)</em></td>
</tr>
<tr>
<td><em>Value on math education</em></td>
<td><em>Glass ceiling</em></td>
<td><em>Representations (image)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Gestures</em></td>
</tr>
</tbody>
</table>

By doing this, I found three themes (See Findings): 1) mathematical code-switching, 2) cultural negotiation, and 3) reasons for providing support. Mathematical code-switching emerged from code-switching that focused on mathematical meaning-making. And, cultural negotiation is about languages, mathematics identities, model minority stereotypes, and seeking information.
And, the reasons for providing support explored their children’s academic progress. Accordingly, the findings chapter has three chapters to discuss this.

**Coding**

The participants’ answers and participation were read and watched several times by the researcher. The researcher coded those responses for main themes and patterns using a narrative inquiry as both inductive and deductive procedures. Each response was sorted according to newly determined categories, and categories were revised based on response. Each section was reviewed for the final determination of the coding system.

**Data Analysis-Timeline**

I collected data over the summer of 2021, and I transcribed the data while I collected the data. After finishing transcribing, I analyzed the data. Data analysis is done in fall 2021. And, writing based on data analysis took two semesters beginning in the fall of 2021. The dissertation defense was held in May 23rd of 2022.

**Findings**

Findings include three chapters (See Table 2): Korean immigrant parents and their children’s mathematical meaning-making focusing on code-switching in observation sessions, cultural negotiation in both observation and interview sessions, reasons for providing support in interview sessions, and perpetual foreigner stereotypes but hope in interview sessions that influences their way of supporting.

The first two chapters focus on the first research question, *How do Korean immigrant parents support their elementary-aged children’s mathematical meaning-making at home during the COVID-19 pandemic?* And, chapter 3 focuses on the second research question, *Why do*
Korean immigrant parents support their elementary-aged children’s mathematical meaning-making at home during the COVID-19 pandemic?

Table 2

The Organization of Findings with Two Research Questions

RQ1: How do Korean immigrant parents support their elementary-aged children’s mathematical meaning-making at home during the COVID-19 pandemic?

Chapter 1: Mathematical Code-Switching
- Repair code-switching
- Justifying code-switching
- Sequencing code-switching
- US math term related code-switching
- Mathematical competence related code-switching

Chapter 2: Cultural Negotiation
- Culture & Language
- Mathematics Identities
- Perceived Smartness and Model Minority Stereotypes
- Lack information, Seek Information: Relying on Missy USA

RQ2: Why do Korean immigrant parents support their elementary-aged children’s mathematical meaning-making at home during the COVID-19 pandemic?

Chapter 3: Reasons for providing support
- Desire to Belong and Survive: STEM & Glass Ceiling
- Filling Gaps in Low Quality of Public Education
- Financial or Physical Reason
- Building a Studying Routine
- I Am (Not) a Tiger Parent
- The COVID-19 pandemic

Participants

I recruited 5 families. And, all participants’ names are pseudonyms, those are chosen by participants. Except for Seong Chan’s family who stayed 4 years, the other four families stayed in the U.S. for more than 10 years. And, participating children were rising 4th, 5th, and 6th graders due to the data collection period being June through Aug in 2021. And, Seong Chan was the only father who teach math at home, and his wife Hyeon Ji also sometimes participated in
this study. As shown in Table 3, participants had various immigration years, ages, occupations, and the number of children.

**Table 3**

*Participants’ Demographic Information*

<table>
<thead>
<tr>
<th>Pseudonym</th>
<th>Age</th>
<th>Year of immigration</th>
<th>Occupation</th>
<th>Spouse’s Occupation</th>
<th># of Children</th>
<th>Child Grade &amp; Pseudonym</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jennifer (mother)</td>
<td>40S</td>
<td>2000s</td>
<td>Student &amp; Staying at home mom</td>
<td>Software Developer</td>
<td>4</td>
<td>3 (rising 4th grader) Jake</td>
</tr>
<tr>
<td>Judy (mother)</td>
<td>30S</td>
<td>2000s</td>
<td>Analyst (Remote work)</td>
<td>general manager</td>
<td>3</td>
<td>4 (rising 5th grader) Lee Sang</td>
</tr>
<tr>
<td>Sun Hwa (mother)</td>
<td>40S</td>
<td>2000s</td>
<td>(temporarily resting) Staying at home mom</td>
<td>Professor</td>
<td>1</td>
<td>4 (rising 5th grader) Ji Hoo</td>
</tr>
<tr>
<td>Seong Chan (father) Hyeon Ji (mother)</td>
<td>40S</td>
<td>2010s</td>
<td>Store manager</td>
<td>Staying at home mom</td>
<td>1</td>
<td>4 (rising 5th grader) Min Hwan</td>
</tr>
<tr>
<td>Ashley (mother)</td>
<td>40S</td>
<td>2000s</td>
<td>Ph.D. Student &amp; Public-school Teacher</td>
<td>Professor</td>
<td>1</td>
<td>5 (rising 6th grader) Aspen</td>
</tr>
</tbody>
</table>

**Jennifer**

Jennifer is a mother of four children. She immigrated to the U.S. around the 2000s due to her husband’s studying and job. Jennifer’s family lived in the Midwest which has a less Asian population. And, her participating child, Jake, is the youngest. Jake is a rising 4th grader, and the interview and observation were conducted in June 2021.

Jennifer’s husband is working as a software engineer, and she self-defined her family as a middle-class family. During the data collection, Jennifer was a student at a university to pursue
her career in the U.S. and she took online classes, so she was physically staying at home during the pandemic.

Jennifer’s first child is an adult, and she shared her educational philosophy has changed after her first child. Jennifer shared her experience with her first child. By borrowing her narratives, she expressed, “I failed” in the interview sessions. This expression didn’t mean that she didn’t support her child at all, rather she supported and excessively cared a bit. And her first child confessed when he was in middle school, “If I do not exist, my mom will be happier.”

Before noticing the first child’s academic struggles, Jennifer’s way of supporting him was having a high expectation. When she listened to her first child’s confession, Jennifer realized her ways of supporting and educating her child should be changed. Jennifer apologized to him again and again. But, Jennifer shared that the emotional hurt took time to heal. Now, Jennifer asked about her child’s opinions about home studying and respected their way of thinking.

Jennifer’s child, Jake, was recommended to take additional GT classes. But, he did not want to participate, so currently he is not taking that. Jake sometimes made multiplication errors during the observation session. But, Jennifer carefully monitored the problem-solving, and she asked for justification so naturally guided him to figure out his mistakes. And, Jennifer tried to encourage him to keep working on the task. Jennifer shared her opinion that these kinds of support helped Jake’s mathematical understanding.

During the COVID-19 pandemic, Jennifer observed Jake's mathematical progress since Jake’s homeroom teacher was surprised by his academic better performance compared to the pre-pandemic period. Because Jennifer could support Jake’s mathematical understanding, she was proud of herself and Jake.

Judy
Judy is a mother of three children. She immigrated to the U.S. around the 2000s to study with her husband. And, after finishing studying, Judy and her husband decided to begin a career in the U.S. Judy’s family lives in the West which has a diverse population. And, her participating child, Lee Sang, is the oldest. Lee Sang is a rising 5th grader, and the interview and observation were conducted in June 2021.

Judy’s husband is working as a general manager, and she defined her family as a middle-class family. During the data collection, Judy was an analyst, and she worked remotely, so she was physically staying at home during the pandemic. Judy liked mathematics when she was a student. And, during pregnancy, she solved mathematical problems for her baby’s prenatal education. She eagerly supports mathematics at home, too.

Judy’s child, Lee Sang, is good at mathematics with his mother’s home support. Judy shared her thoughts that Lee Sang is following well based on her guidance.

Sun Hwa is a mother of an only child, Ji-Hoo. She immigrated to the U.S. to study around the 2000s, then she earned a doctorate. Sun Hwa previously worked as a lecturer at a university. She was temporarily resting from her job to support her child during the pandemic, so she was physically staying at home during the pandemic. Sun Hwa’s husband came to study in the U.S. and became a professor in higher education. Sun Hwa’s family lived in a large city in the Midwest which has a diverse population. Her child is Ji-hoo who is a rising 5th grader, and the interview and observation were conducted in June.

Sun Hwa defined her family as a middle-class family. Sun Hwa’s child, Ji Hoo, is good at mathematics and in GT classes. And, Sun Hwa provided direct mathematical support at home.

Seong Chan
Seong Chan is the father of the only child, Min Hwan. Seong Chan’s family immigrated to the U.S. around the 2010s due to the child's better education. Seong Chan’s family lived in the Midwest which has a diverse population. Seong Chan’s wife Hyeon Ji attended the interview sessions and jumped when she needed it. Comparably new to the U.S., Min Hwan was a rising 5th grader during the data collection. The interview and observation were conducted in July and August 2021.

Seong Chan is working as a store manager, and he self-defined his family as a middle-class family. Seong Chan’s wife, Hyeon Ji, was a stay-at-home mother.

**Ashley**

Ashley is a mother of an only child, Aspen. She immigrated to the U.S. around the 2000s for her husband’s study, her child is Aspen and a rising 6th grader. Ashley’s family lived in the East area which has a diverse population. And the interview and observation were conducted in July and August 2021.

Ashley’s husband is working as a professor, and she self-defined her family as a middle-class family. During the data collection, Ashley was a teacher in a public school and also she studied in a doctoral program at a university.

**Mathematics Contents Area**

During the observation, participants’ math content area varied based on grade level and home studying schedules. Because of the grade and area differences, the contents of the area and studying resources were different (See Table 4). Five families used various workbooks, and Sun Hwa additionally used textbooks that were skipped in her child’s classroom.

**Table 4**

*Participants’ Mathematics Contents Area During Observation Sessions*
<table>
<thead>
<tr>
<th>Participants</th>
<th>Math contents</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jennifer and Jake</td>
<td>1. Multiplication equations</td>
<td>Workbooks</td>
</tr>
<tr>
<td></td>
<td>2. Fraction addition</td>
<td></td>
</tr>
<tr>
<td>Judy and Lee Sang</td>
<td>1. Word Problem-Gaps and differences</td>
<td>Workbooks</td>
</tr>
<tr>
<td></td>
<td>2. Fraction: improper fraction, fraction</td>
<td></td>
</tr>
<tr>
<td></td>
<td>multiplication)</td>
<td></td>
</tr>
<tr>
<td>Sun Hwa and Ji Hoo</td>
<td>1. Angle and Protractor</td>
<td>Workbooks,</td>
</tr>
<tr>
<td></td>
<td>2. Geometry (Angle measure)</td>
<td>Textbooks</td>
</tr>
<tr>
<td>Seong Chan and Min</td>
<td>1. Order of operation</td>
<td>Workbooks</td>
</tr>
<tr>
<td>Hwan</td>
<td>2. Order of operation</td>
<td></td>
</tr>
<tr>
<td>Ashley and Aspen</td>
<td>1. Pre-Algebra: one-variable linear</td>
<td>Workbooks</td>
</tr>
<tr>
<td></td>
<td>equation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Pre-Algebra: one-variable linear</td>
<td></td>
</tr>
<tr>
<td></td>
<td>equation</td>
<td></td>
</tr>
</tbody>
</table>

**Language Choices of Korean Immigrants**

Before addressing the data, this section briefly explains Korean immigrant parents’ language choices. English plays an important language norm to communicate in a global society (Strevens, 1992). English is the common language in the U.S., and collective linguistic norms influence one’s language choice in discourse (Moschkovich, 2007). According to Shin and Miloy (2000), Korean immigrants perceive English as power and prestige to make a success in the U.S. Presumably, Korean immigrants in the U.S. put their highest priority on English acquisition to pursue economic and social success (Shin & Milroy, 2000). Although they value English proficiency, they perceive it as the most challenging part of life in the U.S. Because of English acquisition difficulties and being comfortable in their mother tongue, Korean immigrant family members almost exclusively use the Korean language at home (Shin & Milroy, 2000). My findings also suggest that Korean immigrant parents who are both first-generation couples
commonly mentioned that they prefer to use Korean at home. H. Kang (2013) also asserted that Korean immigrant parents all had strong desires to raise their children bilingually in English and Korean. Similar to H. Kang’s study, another recent research suggests that Korean immigrant parents try to use the Korean language at home as assets for their children including cognitive-intellectual involvement (Sok & Schwartz, 2021). And, both interview and observation data in the current study reconfirm scholars’ (H. Kang, 2013; Sok & Schwartz, 2021) argument that they desire their children to become bilingual. And, at home, participating parents in this study use mostly Korean.

Nonetheless, in terms of academic parental involvement, the participating Korean immigrant parents' perceived language hierarchy for children in English at the top which is aligned with the Myers-Scotton’s (2017) markedness theory that language choices that are related to the “normative and expected practices in a given community” (Shin & Milroy, 2000, p.352). The issue of power is inherent within the parent's desire to choose US mathematics culture over their own in their use of language. This power relationship creates that Korean immigrant parents try to use U.S. mathematics terms at home, but they also speak the Korean language to explain the context or situation for the mathematical concepts since Korean is a natural form of language at home. To help their children’s U.S. mathematical meaning-making as a normative language of English math terms, participating parents purposefully changed their home language into English for the mathematical term expressions.

Not surprisingly, all five participating parents mentioned that bilingualism is not directly related to academic progress in schooling which differs from Sok and Schwartz’s (2021) suggestion of the asset of bilingualism in an academic way. Rather, participating parents in the current study perceived Korean learning as an asset for the long-term goal of career path,
relationship with parents and grandparents, or future visits to Korea. For example, some participating parents mentioned that if their children have a job in Korea or Korean community-related careers.

Table 5
Parents’ Perceptions of Bilingualism in Academic Performances

<table>
<thead>
<tr>
<th>Five Parents’ Perceptions of Bilingualism in Academic Performances</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Jennifer</strong></td>
</tr>
<tr>
<td><strong>Judy</strong></td>
</tr>
<tr>
<td><strong>Sun Hwa</strong></td>
</tr>
<tr>
<td><strong>Seong Chan</strong></td>
</tr>
<tr>
<td><strong>Ashley</strong></td>
</tr>
</tbody>
</table>

**A Child’s Language Preferences**

**Ji Hoo** Sometimes, my mother explains some concepts in Korean, so I don’t understand.

As shown in Table 5, based on Korean immigrant parents’ narratives, they perceived the importance of bilingualism for their children’s long-term career paths, or relationships with parents. And, Korean immigrant parents shared that their perception of Korean skills is not directly related to their children’s academic performances at school. One of the participating children, Ji Hoo mentioned that her mother’s Korean explanation is more confusing for understanding mathematical concepts.
English versus Korean Scripts: Code-switching and Translation

In the discourse between parents and children, they use frequent code-switching between Korean and English. To help the audience understand, I marked an English translation from Korean. After having the original of having two languages in a sentence, I inserted the translation with italicized fonts that shows Korean parts. And, English spoken parts were expressed with bold fonts where the code-switching happened from Korean. Thus, the final scripts include both languages and translations line-by-line. And, the English part is not italicized but bolded. This is to help the reader of this study to see how Korean and English shifted naturally among immigrant parents and their children. As shown in Table 6, I created a translation example that shows how I represent the data in response to code-switching but not about code-switching itself. The left column in Table 6 has the originally spoken language with the mixed language of code-switching, and the right column in Table 6 has translated from Korean and is expressed with italicized fonts. And, with the arrow mark in the table, I show the finally adapted version of the code-switching part and English translation line-by-line under the same speakers’ turn.

Table 6

The Translation Example to Represent the English and Korean Data

<table>
<thead>
<tr>
<th>Code-Switching</th>
<th>English only version</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  [Min Hwan] Okay, equals five plus six</td>
<td>1  [Min Hwan] Okay, equals five plus six</td>
</tr>
<tr>
<td>2 times five...the answer is thirty-five</td>
<td>2 times five... the answer is thirty-five</td>
</tr>
<tr>
<td>3  [Seong Chan] 전에는 27이라고</td>
<td>3  [Seong Chan] Previously, you wrote</td>
</tr>
<tr>
<td>4 썼는데, 다시 한번, 그럼 민환이가</td>
<td>4 the answer was 27, Min Hwan, let’s</td>
</tr>
<tr>
<td>5 전에 풀었던 것도 어떻게 풀었는지</td>
<td>5 look at your way of problem-solving</td>
</tr>
<tr>
<td>6 한번 다시 풀어 볼까?</td>
<td>6 again.</td>
</tr>
<tr>
<td>7  [Min Hwan] One time twenty?</td>
<td>7  [Min Hwan] One time twenty?</td>
</tr>
<tr>
<td>1</td>
<td>[Min Hwan] Okay, equals five plus six times five... answer is thirty-five</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>2</td>
<td>[Seong Chan] 전에는 27이라고 썼는데, 다시 한 번, 그럼 민환이가 전에 풀었던 것도 한번 봐볼까요?</td>
</tr>
<tr>
<td>3</td>
<td>Previously, you wrote the answer was 27, Min Hwan, let's look at your way of problem-solving again.</td>
</tr>
<tr>
<td>4</td>
<td>[Min Hwan] One time twenty?</td>
</tr>
<tr>
<td>5</td>
<td>[Seong Chan] 이거 민환이가 어떻게 했었던 것 같아? 생각을 해 봤어. 어떻게 했었어?</td>
</tr>
<tr>
<td>6</td>
<td>Min Hwan, do you remember how you solved the problem previously? Think about it, how did you solve it? Can you guess it?</td>
</tr>
<tr>
<td>7</td>
<td>[Min Hwan] 이거를 위에 거 밖에 안 했어요.</td>
</tr>
<tr>
<td>8</td>
<td>[Seong Chan] did addition instead of multiplication, <strong>one half plus one half</strong>, right?</td>
</tr>
<tr>
<td>9</td>
<td>[Min Hwan] I did only the numerator part.</td>
</tr>
<tr>
<td>10</td>
<td>[Seong Chan] Did you do only the numerator?</td>
</tr>
<tr>
<td>11</td>
<td>[Min Hwan] No, I mean I added those two numbers.</td>
</tr>
<tr>
<td>14</td>
<td>[Seong Chan] 아니고 더하기로 했네? One half plus one half</td>
</tr>
<tr>
<td>16</td>
<td>[Seong Chan] 아니고 더하기로 했네? One half plus one half</td>
</tr>
<tr>
<td>18</td>
<td>[Seong Chan] 아니고 더하기로 했네? One half plus one half</td>
</tr>
</tbody>
</table>
Mathematical Code-Switching (MCS) for Meaning-Making

The first chapter and second chapter in finding answers to this question, *How do Korean immigrant parents of elementary-aged students support their children’s mathematical meaning-making at home during the COVID-19 pandemic?*

The first chapter of findings navigates the language shifts which is called code-switching for mathematical meaning-making between Korean immigrant parents and their children at home during the COVID-19 pandemic. To support mathematical meaning-making, Korean immigrant parents and children changed languages in their narratives between Korean and English languages. This is called code-switching (Auer, 1995; Moschkovich, 2007; Shin & Milroy, 2000), which means bilingual people could use two languages and change language according to their different needs. Based on examples of Shin and Milroy’s code-switching patterns, I further establish ‘mathematical code-switching’ (MCS) as shifting two languages that aim to discuss the meaning of mathematical concepts, mathematical terms, and procedural understanding of mathematical context, or mathematics identities. By listening and looking at their narratives, I found five different patterns in mathematical code-switching that Korean immigrant parents and their children’s mathematical meaning-making. Five code-switching happened to make mathematical meaning in immigrant parents and their children are: 1) Repair (Self-repair) code-switching is to clarify mathematical meaning by reiterating that in another language, 2) Justifying code-switching is the speaker (parents) reiterating in another language to ask the audience (child) to explain about its mathematical reason of their dissatisfactory responses (e.g., I think this way wrong, but could you explain it?), or unclear responses for the audience (e.g., I
don’t understand what you are explaining), 3) Sequencing code-switching is that connect distinct part of the mathematical procedures with aim of achieving whole tasks, 4) US mathematics term-related code-switching is that gives priority on using English mathematical expressions, and 5) Mathematical competence related code-switching is that jump in for explaining the mathematical meaning and/or ways of problem-solving.

**Mathematical Code-Switching (MCS) in Narratives**

All five participating parents used code-switching in their narratives with their mathematical meaning-making. Mathematical terms are displayed (or translated) between Korean and English languages. Immigrant parents may need support to understand English terms in their children’s mathematics schoolwork (Ladky & Peterson, 2008). Korean immigrant parents and their children frequently use code-switching to communicate better mathematical ideas.

According to Auer (1995), there are two ways to switch languages: discourse-related and participant-related. However, Shin and Milroy (1995) developed Auer’s theory, but also admitted that discourse-related and participant-related code-switching are not mutually exclusive (p.361), and sometimes happen together. Discourse-related code-switching is about building contrast between two languages. By employing conversation analysis and Auer’s code-switching theory, Shin and Milroy (2000) further discussed several types of code-switching in discourse-related code-switching: 1) Turn-taking-related code-switching is changing the turn between speaker and listener by changing languages, 2) preference organization code-switching is when dissatisfactory responses occur the speaker reiterates the preferable expression again, 3) repair code-switching to clarify meaning by reiterating that in another language, and 4) sequencing of activities that connect structurally distinct part of the discourse.
Shin and Milroy (2000) also distinguished participant-related code-switching which is about participating parents changing the language based on preferences or competence: 1) preference-related code-switching is when speakers change languages based on individualistic preferences for one language or the other. 2) Competence-related code-switching is people carefully monitoring their partner’s speech production and adapting their own language choice.

By looking at data, I found five types of code-switching patterns in mathematical meaning-making. I did not follow exactly the same Shin and Milroy’s code-switching of discourse related versus participating parents related because those are not always mutually exclusive categories as Shin and Milroy discussed in their study (2000). Rather, I tried to look at mathematical contexts and parents' and children’s mathematical ideas exchanges for meaning-making. These five types of code-switching create “Mathematical code-switching” to deliver mathematical meaning, concepts, mathematical terms, mathematical identities, or mathematical context in bilingual discourse.

First, repair code-switching is originally named as codeswitching contextualizing repair (Shin & Milroy, 2000) to repeat to clarify by changing language. This repair has two directions of self-repair for “I mean…” to clarify its meaning. And, other-initiated self-repair is to answer the question, “Do you mean…?” (usually from parents) to clarify the other person’s (child) speech. This study discusses self-repair code-switching to clarify mathematical meaning. And not leaning toward other-initiated self-repair because other-initiated self-repair did not result in code-switching (See Extract 1.2).

Second, justifying code-switching which is originally termed codeswitching contextualizing preference organization. But participating parents in this study had preferences in the mathematical process itself, so code-switching occurred to ask the reasoning of problem-
solving or provide the reasoning of how to solve the problem. This is to ask about “Why did you solve this way…?” that parents ask about reasoning and problem-solving to listen to children’s way of thinking.

Third, sequencing code-switching is used for bracketing activities (Shin & Milroy, 2000). However, in mathematics, this function can be interpreted to guide each step in order of problem-solving as a whole process.

Fourth, US math term-related code-switching is based on Shin and Milroy’s (2000) preference-related code-switching. In terms of parental involvement, participating parents’ preference of language is U.S. mathematical terms to have a better understanding in school mathematics for their children's mathematical interaction sessions although they exclusively use Korean at home. This is because participating parents perceived US mathematics terms as norms for their children’s school community where use English so that they try to avoid confusion for their children’s understanding of mathematical meaning.

Fifth, mathematical competence-related code-switching is about monitoring the competence of mathematical understanding and changing the language to explain the mathematical meaning and/or ways of problem-solving. These five types of code-switching are explained in table 7.

Table 7
Five Types of Mathematical Code-Switching

<table>
<thead>
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<tr>
<td>Discourse related</td>
<td>Repair code-switching</td>
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<td>› Repair</td>
<td>Justifying code-switching</td>
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<td>› Preference organization</td>
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<tr>
<td>› Sequencing code-switching</td>
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Sequencing of activities

- Participant related
- Preference related
- Competence related

US math term-related code-switching
Mathematical competence related code-switching

Repair Code-Switching

Auer (1995, 2010) named discourse-related code-switching that is the structural contrasts between two different languages. Among that, Shin and Milroy (2000) provided codeswitching contextualizing repair. To clarify its meaning, the same meaning of the utterance is displayed with the reiteration of two languages. A speaker can reiterate an utterance for emphasis in different languages (Shin & Milroy, 2000) that has either two situations: “I mean…” (Self-repair) or “Do you mean…?” (Other-initiated self-repair) to clarify its meaning (Auer, 1995).

This study also shows the codeswitching contextualizing repair that is established by Shin and Milroy (2000). Presumably, repair code-switching happened in parents’ self-repair situation when they realized children could not grab the mathematical meaning, so they changed their language. For example, to explain a fraction concept, as shown in Extract 1.1, Judy spoke “나누어 떨어져 (simplified)” (line 1), and “simplify” (line 4) again in English. Judy self-repaired in another language to address its meaning again for Lee Sang.

Just following the debriefing session of observation 1, I asked about the use of English in the observation sessions since Judy kept using key math terms in English. Judy explained the reason for shifting languages when her child cannot understand mathematical concepts by using Korean, then she explained that concept again in English. Judy’s language choice is firstly given to Korean, but she tried to reiterate the narrative in English again to help children understand the mathematical meaning with self-repair.
[Judy] I explain math in Korean because my mother tongue is Korean, so my English is not perfect. But, Korean is perfect. So, I explain the mathematical meaning in Korean first, but my child doesn't seem 100 percent, then I try to explain it in English again. However, in the parental involvement situation in meaning-making, other-initiated repair (parent-initiated repair) did not result in children’s answer of code-switching because the child corrected the answer in English only (See Extract 1.2).

Extract 1.2 shows how other-initiated repair but not connected to code-switching. Judy noticed her child's undesirable answer in line 6, then she initiated repair by asking for the wrong answer (line 8), “Why four third?” The given task is to cross cancel in fraction multiplication: $\frac{1}{3} \times \frac{3}{4}$. Judy guides children to figure out mathematical mistakes by himself (Other-initiated repair). However, Lee Sang repaired but it was in English. Also, Judy adapted by repeating her children’s answers in English in line 11. So, this scene shows that other-initiated repairs are not always related to code-switching for second-generation children.

**Extract 1.1**

*Judy, Observation Session 2*

**Task:** 11 crafters share 115 glue sticks. How many glue sticks does each crafter get?

1 [Judy] 되 나누어 떨어져, 안 떨어져?

2 Can it be simplified, or not be simplified?

3 [Lee Sang] ...

4 [Judy] remaining 이 있다는 건 Simplify 가 안 된다는 거야, 이해돼?
If you still have remaining numbers, that means it cannot be simplified, does this make sense?

Extract 1.2

Judy, Observation Session 2

Task: \( \frac{1}{3} \times \frac{3}{4} \)

1. [Judy] 여는 simplify 되겠어? 안 되겠어? [crossing out the number 3 in diagonal order]
2. order]에도 one,에도 one. 그럼 얼마야 Lee Sang 야?
3. Is this one simplified, or not? [crossing out the number 3 in diagonal order] This number [three] becomes one, this number [three] also becomes one. Then, what could come, Lee Sang?
4. [Lee Sang] Four third. [undesirable answer]
5. [Judy] 왜 Four third 야? [pointing out the mistake]
6. Why four third? (Other-initiated to request repair)
7. [Lee Sang] Ah, one-fourth [\(\frac{1}{4}\)] (code-switching did not happen)
8. [Judy] One-fourth [\(\frac{1}{4}\)] 지.

Justifying Code-Switching

The second, justifying code-switching referred to originally categorized as “code-switching contextualizing preference organization” (Shin & Milroy, 2000). Code-switching contextualizing preference organization happens when a disagreement (e.g., unclear responses for the audience) or undesirable responses occur (e.g., when a child made mistakes), then the
audience changes their language. By changing their language to request an explanation, the audience jumps in as a speaker to guide the other person to have desirable responses. However, within this study of mathematical meaning-making, that preference organization is related to the justification of problem-solving or to providing the reasoning of how to solve the problem. Subsequently, I named it for justifying code-switching to request justification by wishing to align with the desirable problem-solving. For example, Korean immigrant parents request to justify their reason for problem-solving. And, a child provides its reasoning for problem-solving.

In Extract 1.3, Min Hwan, a child, solved the same task again since he made a wrong answer before which was three/fourth. In line 1, Seong Chan initially asked the reasoning behind the wrong answer of the previous attempt in Korean. However, Min Hwan pondered his way of problem-solving, then Seong Chan contrasted the language from Korean to English, “Why did you write this three/fourth?” (line 4). And, Seong Chan addressed the importance of the process of problem-solving by saying making mistakes leads to not receiving a full score in lines 9-11.

When I asked why he is asking about reasoning in a debriefing session asked about Extract 1.3, Seong Chan shared his belief in the importance of the process and way of thinking. Therefore, Seong Chan’s preference for the organization was the value of the process of problem-solving, so he asked for a justification for his child. Based on his preference organization, Seong Chan asked the reasoning for Min Hwan several times. “I believe that the problem-solving process and reasoning are also important as the answer. So, I asked Min Hwan the reason for problem-solving as usual [since he made mistakes].”

Extract 1.3

Seong Chan, Observation Session 1
Task: \( [(\frac{1}{2})^3 + (\frac{1}{4})^2] \times 2^2 \)

1. [Seong Chan] 그림 three/fourth라고 써서 때 왜 썼을 거라고 생각하세요?
2. *Then why did you write this three/fourth?*
3. [Min Hwan] umm...
4. [Seong Chan] *Why did you put three/fourth?*
5. ...
6. [Seong Chan] Min Hwan 이가 이렇게 과정도 쓰고 답을 쓰잖아. 답이 맞아도 중간에 이렇게 식을 잘못 쓰는 경우가 있으면 이거는 out 이든지 아니면 a half score 밖에 안 쳐.
7. *Min Hwan, you wrote the problem-solving process and wrote the answer. Although your answer is correct, if you made the mistake in the process of problem-solving, then your answer is out or you will receive only a half score.*

Extract 1.4 also shows Seong Chan’s request justification of problem-solving by doing code-switching (lines 9-10). And, the child, Min Hwan, provided his reasoning for his previously written ways of problem-solving. Min Hwan said that he did the computation of two numbers without doing multiplication (lines 11-16). Seong Chan changed from Korean to English about the reasoning in English, “One half plus one half” (lines 19-20) carrying out his child's justification. As shown in Extracts 1.3 and 1.4, Seong Chan's preference organization was to request justification since he values the process of problem-solving which is as important as the answer (See Extract 1.3). By asking about the reasons for the problem-solving process, he kept reminded of the importance of the whole process of problem-solving that is rooted in his preference of the value of the problem-solving process *per se.*
**Extract 1.4**

*Seong Chan, Observation 1*

Task: \((\frac{1}{2})^2 \times 20 + 1\frac{1}{5} \times 5^2\)

1. [Min Hwan] Okay, equals five plus six times five... answer is thirty-five

2. [Seong Chan] 전에는 27이라고 썼는데, 다시 한 번. 그럼 민환이가 전에 풀었던 것도 한번 봐볼까?

3. Previously, you wrote the answer was 27, Min Hwan, let’s look at your way of problem-solving again.

4. [Min Hwan] One time twenty?


6. Min Hwan, do you remember how you solved the problem previously? Think about it, how did you solve it? Can you guess it?


8. I did only the numerator on the fraction.

9. [Seong Chan] 위에 거 밖에 안 했나요?

10. Did you do only the numerator on the fraction?


12. No, I mean I added two numbers \([\frac{1}{2} + \frac{1}{2}]\)

13. [Seong Chan] 그러니까 금하기가 아니고 더하기로 했네요? One half plus one half

14. 했잖아, 그렇지?
So, you mean by that you did addition instead of doing multiplication, one half plus one half, right?

[Min Hwan] Right.

[Seong Chan] 제곱한 게 아니라. 그렇지? 그래서 틀린 거 같지. 그래서 이런 것도 실수를 할 수가 있다는 거야. 민환이가 이거 잘못 써가지고 Okay. [Found an error, 1/2+1/2, instead of a power of ½]

You didn’t do a power of ½, right? So, you made a mistake. Likewise, you may make a mistake like these problems. Okay. Min Hwan, you wrote this wrong, Okay. [Found an error, 1/2+1/2, instead of a power of ½]

Ashley’s preference organization as the value of knowing her child’s reasoning is to figure out her child’s current understanding, and that guides her child’s further mathematical meaning. As shown in Extract 1.5, Ashley requested justification in line 3 in Korean, then asked it again in English how Aspen understood it in line 4 by changing the language to English. Similar to Seong Chan’s code-switching, Ashley did code-switching from Korean to English to point to the part of the equation. Ashley asked about the mistakes and how has happened to remind her child to find the reasoning behind the problem-solving process. And, Aspen justified how she solved that. Ashley asked about the differences in current problem-solving and previously solved ways (line 10). And, Aspen explained she didn’t consider the “3 more” part of the problem (line 12). So, Ashley requested justification by doing code-switching, and Aspen provided why she made mistakes in her previous problem-solving. In a debriefing session after observation 2, Ashley said, “Whenever my child makes a mistake, I should keep finding the reason for that. That helps me to find what kinds of additional support for her current level of understanding.”
Extract 1.5

Ashley, Observation 2

Task: After Lois picks a value for \( b \), Clark must solve the equation

\[
2x + 7 - x = 4x + 2b - 3x - 3b
\]

Clark uses Lois’s \( b \), then tries to solve the equation by repeatedly guessing values of \( x \) until he guesses the right one. However, for every \( x \) he picks, the left side is always 3 more than the right side. What value of \( b \) did Lois give Clark?

2. Do you understand this? Could you explain this step to mommy, if you understood?
3. [Ashley] \( x \) plus seven minus \( x \) minus \( b \) equals always three 야?
4. Why does \( x \) plus seven minus \( x \) minus \( b \) equals always three?
5. [Aspen] Because when you simplify the left and the right side, we get seven equals \( x \) minus \( b \). So, you know the difference between the three. That subtracts the right side from the left side. And then we can solve these 7 plus \( b \) equals three. Which gives \( B \) equals negative four.
6. [Ashley] 그러면 너는 여기 몇 때 쉬를 밖에서 시간 거야?
7. So, what did you miss in solving this problem?
8. [Aspen] 오거 Difference between the three.
**Sequencing Code-Switching**

The third code-switching is *sequencing code-switching*. I referred to codeswitching contextualizing side-sequences (Shin & Milroy, 2000) of bracketing activities that are to make a whole conversation smoothly for delivering the meaning of main topics when it was not successful. For example, a speaker is explaining a story, but the speaker thinks the audience did not receive the flow of the story, then the speaker used another language to deliver the main topic. The code-switching here functions as the bracketing activities so that the speaker tries to make a smooth transition that accomplishes the goal of delivering the main topic.

Since this study aims to look at mathematical meaning-making, the function of brackets off a side-sequence can be interpreted in guiding sequences of mathematical steps or the order of problem-solving. Within this study, sequencing code-switching is when a parent thinks the child did not perform or understand each step of a procedural math task, then parents used another language to guide the next steps to move forward to have the whole procedural meaning-making in mathematics.

As I discussed in the section in Language Choices of Korean Immigrants, participating Korean immigrant parents perceived English as the top priority to help their children’s academic progress because they believed English as “normative and expected practices” (Shin & Milroy, 2000, p.352) within their children’s school community. participating parents perceived the English math terms as a norm. To deliver complex sequences in mathematics, although parents preferred to use Korean as the most comfortable language at home, they try to use both languages with Korean and English words or expressions to help children understand each step in the sequence of the problem-solving or mathematical tasks. For example, participating parents explained the context or other situations in Korean, but they spoke English to highlight steps of
procedures or important ideas. The power relationship is evident within the parent's desire to choose the English language to help their children’s U.S. mathematical meaning-making as a normative language of English math terms to express complex sequences in the step-by-step explanation.

Extract 1.6 shows a mother, Sun Hwa, tried to remind her child of a sequence of drawing an angle (lines 1-5). Drawing an angle requires a step-by-step procedural task: After drawing a baseline, and using a protractor to mark a correct angle, then connect the vertex and the marked dot of the measured angle. Sun Hwa highlighted the sequencing verb “connect” (line 10) in English to suggest the next task to draw an angle. However, by looking at Ji Hoo’s drawing of an angle, Sun Hwa jumped again in English to remind her about the similar length of each side of the angle for completing the task (line 13) was finishing up the procedure of drawing and angle in mathematical meaning-making.

**Extract 1.6**

*Sun Hwa, Observation 1*

1  [Sun Hwa] 자, 그 다음에는 can you draw the angle?

2  Then, the next task, **Can you draw the angle?**

3  [Ji Hoo] Oh, okay. We did this.

4  [Sun Hwa] 응, 저번에 해봤지? Okay.

5  Right, **You did this before.** Okay.

6  [Ji Hoo] [use the protractor and draw the dot] Okay… Now one hundred five degrees

7  would be [put a dot pointing to a protractor]

Yes. Did you mark a dot of angle measurement? Then, now you can connect the marked dot and the vertex. Okay. That’s right.

[Ji Hoo] ...[drawing a long line to connect a marked dot from vertex]

[Sun Hwa] No, that’s too long. 거기 위에까지는 아니고요. 왜냐면 try to… 어. length 가 비슷하게 왜야 돼. Okay. 그래 보기 예쁘잖아. 원본은 아니지만, 롤인지 모르겠네. 이것이 근데 기왕이면은 대충 비슷해야지. 이렇게 옷기잖아. 그치?

No, that’s too long. You don’t need to draw a very long line. Because we try to... ugh. both lengths should be similar. Okay. That looks pretty. I don’t know if this is a mathematical rule or not. But, I think this would be better visually. Right?

**US Math Term Related Code-Switching**

Fourth, US math term-related code-switching is based on Shin and Milroy’s (2000) preference-related code-switching under Auer’s (1995) categories of participating parents related code-switching. The reason why participant-related codeswitching is a preference-related code-switching is that participating parents have a certain preference to use language, then they change their languages with their preferences (Shin & Milroy, 2000). And, that is also called the markedness model (Myers-Scotton, 2017) which is that individuals make a language choice with regard to power and prestige in a society that is inevitably an influential factor to make one’s decision.

To achieve children’s mathematical meaning-making, participating parents’ personal preferences are given to use U.S. mathematical terms. This is because, as I discussed in the section in Language Choices of Korean Immigrants, participating Korean immigrant parents
believed their children should understand mathematical terms in English in order to understand school mathematics that yields better performance and avoid confusion to communicating with peers and teachers. Correspondingly, participating parents mentioned that they are trying to understand U.S. mathematical terms and try to embrace those US terms in observation sessions. They even believed Korean math term would lead their children to be confused. participating parents tried to use English math terms or U.S. math expressions to help their children’s mathematical meaning-making although parents preferred to use Korean as the most comfortable language at home. For example, explaining the meaning of the term was in Korean, but parents switched language to express the U.S. mathematical terms.

The participating parents preferred to use precise US mathematics terms while highlighting their meaning or explanation in Korean. This form of code-switching shows their preference for that U.S. mathematical term as a norm for their children. In this section, I focused on individual preferences that are related to putting priority on US mathematical terms. Accordingly, the speakers tried to communicate a US mathematical term as is in English, not translate it to Korean.

As shown in Extract 1.7, in the debriefing session, Jennifer explained the reasoning for using mathematical terms in English is to avoid confusion in the child’s classroom mathematical engagement and remembering the specific math concepts (lines 4-6). Although her daily basic language setting is Korean, she is trying to employ the U.S. mathematical terms to help children understand the U.S. mathematical language and concepts.

**Extract 1.7**

*Jennifer, Debriefing session after observation 1*
[Jennifer] I usually speak Korean at home. However, when I speak mathematical terms in Korean, my children get confused. So, I tried to use English mathematical terms to help Jake’s understanding of mathematical concepts...I usually use Korean for explaining situations or context, however, I tried to use mathematical terms in English. Because when my child takes math classes, remembering the same English term would be easier for him to remember the math fact. For example, I used the English math term for an equivalent fraction.

Extract 1.8 shows a specific example of how U.S. math term-related code-switching naturally happens. Jennifer purposefully expressed the U.S. math term, vertical alignment in English to ease Jake’s understanding and remembering the mathematical procedures. Admittedly, sometimes people use English in these situations because there is not a word available in their home language. However, the vertical alignment is called 세로셈 (Serosem, vertical alignment) in Korean (line 1). Although Jennifer speaks Korean at home, she used to use English mathematical terms throughout the mathematical interaction sessions. Jennifer’s child, Jake speaks most of his conversation in English, which is the familiar form of the communicative language. Jake remembered the vertical alignment of the calculation (line 5) based on his previously learned concept.

**Extract 1.8**

*Jennifer, Observation 1*

1. [Jennifer] 이거, 엄마가 vertical alignment 가르쳐준 거 한번 해볼래? 해봐... 이거
2. 어떻게 하는데지 엄마 Jake 한 번 풀어봐.
For this, could you try the **vertical alignment** that mommy taught you before? Try it...

How can you do this? Jake, please try to solve this.

Judy, Observation 2

Task: \( \frac{6}{7} \times \frac{1}{2} \)

1. [Judy] 먼저 cross canceling 는 먼저 없앨 거 먼저 없애라는 거. 야까 엄마가 같이.
2. 엄마가 야까 알려 준 거지?... simplify 먼저 하는 걸, 이게 “cross canceling”이라고 하나보네.
First of all, **cross canceling** is that you should simplify first by looking at a common denominator to cross out each other. I just explained this before?... It looks like in the U.S., doing **simplifying first** is referred to as “**cross canceling**”

Extract 1.10 shows justifying code-switching and U.S. math term-related code-switching happens together. By asking questions about the reasons, Ashley tried to request her child’s reasoning about the numbers of variables and Aspen is giving a reason. And, at the same time, Ashley used the U.S. mathematical term, variable. Aspen solved the math problem by setting two variables in the initial trial, however, it was hard to figure out the relationship between having two variables. So, Ashley suggested Aspen for doing the second attempt. And, Aspen figured this out by putting only one variable for this problem. However, Ashley wanted to make sure how her child approached that way. So, in lines 1-4, Ashley requested justification for her child why she was using only one variable instead of using two variables to solve this word problem. And, Ashley used the English term ‘*variable*’ not in Korean ‘변수’ (Byeon Soo, *variable*) which shows U.S. math term-related code-switching. Then, Aspen answered, “That makes it easier.”

**Extract 1.10**

_Ashley, Observation 2_

Task: Five years ago, my grandfather was five times as old as I was. Three years from now, my grandfather will be three times as old as I will be. How old am I now?

2. 하나만 있어야 되는 거야?
Aspen, I am curious why we should not do this way? Why did you use only one variable?

[Aspen] That makes it easier.

**Mathematical Competence Related Code-Switching**

Fifth, *mathematical competence-related code-switching*, which was originally termed competence-related code-switching (Auer, 1995; Milroy, 1995; Shin & Milroy, 2000). Competence-related code-switching (Shin & Milroy, 2000) happens when the audience notices the speaker’s competence-related issues such as misunderstanding or grammar issues, the audiences become speakers by changing their language to communicate better with each other.

However, within this study with the aim of mathematical meaning-making, the competence is based on children’s understanding of the mathematical meaning. Thus, this study named mathematical competence-related code-switching that participating parents in this study jumped when children made mistakes or errors based on mathematical understanding by changing language. Participating parents carefully monitored children's mathematical competence then they jumped into conversation by changing their language whenever children showed mistakes in mathematical understanding. Parents changed their language to provide explanations of the mathematical meaning and ways of problem-solving.

Extract 1.11 shows how mathematical competence-related code-switching happens. Jennifer noticed Jake’s multiplication mistakes in his writing, then asked to check whether if his multiplication is an issue “Then, what could be **eight times six**?” (line 2). This could be justifying code-switching, but this helps her to figure out Jake’s competency in that task since Jake answered this “fifty-four” (line 4) which was not correct. By noticing mathematical competence issues, Jennifer explained the alternate way to solve the multiplication task with
code-switching that explains child’s mistakes and suggest way of problem-solving. She suggested when Jake is confused or forgot the multiplication factor (line 12). And, in line 13, she pointed ‘six times eight’ in English. the numbers can be divided into smaller numbers (line 15-16) to help the child’s retention and allow children to find the correct answer. Then, she wrote down the way in her writing, [write down from 6 × 8 to 6 × 4 × 2] (line 21). Jennifer is changing language from Korean to English for expressing; multiplication (line 11), six times eight (line 13), and four (line 15) to remind him of his mathematical competence related issues to be resolved. And, at the same time, she wrote the two math expressions (line 21) to help Jake to see the structure of the new expression that helps to find the multiplication factor.

Extract 1.11

Jennifer, Observation 1

Task: Check T or F: \((2 \times 4) \times 6 = 2 + (4 \times 6)\)

1 [Jennifer] 그럼 eight times six 왜야? eight times six 왜야? Jake?

2 Then, what could be eighth times six? What could be the answer for eight times six?

3 Jake?

4 [Jake] Fifty-four, yes.

5 ... [Jake confused to find the multiplication answer]

6 [Jennifer] Jake, 사실은 Jake 가 multiplication 을 빠리 외우는 것은 좋아. 근데

7 Jake 이가 핫갈리고, 잘 모르는 거는 왜 그렇게 되는지 먼저 알아야 해. 뭐봐. six times eight 이지? 그런 잘 모르지. 기억 못했지? 그러면 어떻게 해야 해? 그럴
Jake, to tell the truth, it is good that you remember the multiplication table so quickly. However, Jake sometimes gets confused, and cannot recall the number. Then, you should figure out how it can be. Look at this. This is six times eight. You could not remember the answer to the multiplication table, right? Then, how should you approach this question? Then, you can do it this way. Look at [write] this number can be divided by four. Jake, this way, how about looking at it this way?

Then, Jake, you made a mistake, please think about it this way. Is this possible or not? Can you do this, or not?

Forty-eight.

As shown in Extract 1.12, in the debriefing session right after the observation session (See Extract 1.11), Jennifer explained the reasoning behind monitoring and explained alternative ways of problem-solving. In lines 8-10 in the Extract 1.12, Jennifer explained why she suggested using a smaller number to work on the multiplication tables. By monitoring, Jennifer noticed her child that he made mistakes in the higher numbers’ multiplication table. In line 11, she reveals her educational philosophy as not forcefully teaching him to memorize mathematics. Rather, she
suggested the alternate way that Jake can find the smaller number times tables when her child
forgets the larger number times tables.

*Extract 1.12*

*Jennifer, Debriefing Session After the Observation 1*

1 [Jennifer] I try to guide my child to realize his mistake. Because sometimes his way of
2 problem-solving is correct, but there could be arithmetic mistakes that make the wrong
3 answer. So, I tried to suggest an alternate way.
4 …
5 I have worked on my child's practice memorizing the multiplication table. However,
6 he was distracted and hardly memorized some of them. And, he is confused between
7 the seven times table and the eight times table. And, he said those are so confusing,
8 and he said I cannot memorize this. So, I suggested dividing numbers for example 8
9 becomes 4 and 2. Because the 4 times table is already practiced and those are easy for
10 him. So, I suggested that the bigger numbers can be divided into smaller numbers of
11 tables. Basically, I do not force my child to remember the multiplication table. But, I
12 tried my child to find the ways although he cannot memorize them. I do not blame him
13 for forgetting some math factors. Because I think people naturally forget things. So, I
14 just say you forgot this. So, how can we solve this? And, his condition is not so good
15 to work on math tasks. Then, I suggested an alternate way of multiplication. Instead, I
16 believe the core thing for the lesson is he can understand the mathematical principles.
17 Multiplication is based on several times of addition. I aim for my child to understand
18 those mathematical principles, like understanding multiplication tables, although it
19 takes time.
Extract 1.13 also shows mathematical competencies related to code-switching that a parent monitors her child’s mathematical understanding. Judy highlighted Lee Sang’s mistakes in English (lines 7-8). In her code-switching, the competence is monitored by connecting previously explained concepts of simplification. Then Judy spoke the multiplication factor in English: **Two times two equals four. Two times three equals six** (lines 7-8). Judy explained her value in providing intervention and explanation whenever she finds mathematical competence issues from her child in the debriefing session. Extract 1.14 shows Judy’s explanation continued during daily practices to guide Lee Sang’s understanding of fraction concepts. Judy used various representations such as paper and cucumbers (line 2). She cut cucumbers as a familiar example for building up a conceptual understanding of fraction concepts (lines 3-4). Judy relentlessly explained the fraction concepts, so finally, her children understood and suggested stopping eating cucumbers (lines 5-7).

**Extract 1.13**

*Judy, Observation 2*

Task: $\frac{6}{7} \times \frac{1}{2}$

1. [Lee Sang] [pointing to the numerator six and denominator 2 on $\frac{6}{7} \times \frac{1}{2}$]. 이게 one,
2. 이게 two. [He was confused. After simplifying, the number six should be three]
3. [pointing to the numerator six and denominator 2 on $\frac{6}{7} \times \frac{1}{2}$] this one becomes one, this one becomes two. [He was confused. After simplifying, the number six should be three]
4. [Judy] 아니. 이게 왜 two 냐? Two times two equals four. Two times three equals six.
No. Why does this become two? Two times two equals four. Two times three equals six.

[Lee Sang] Three? [noticed his mistake and said it correctly]

[Judy] Simplify 처음 해보는 것도 아니고, 그래.

You are not simplifying the first time, right?

Extract 1.14

Judy, Debriefing Session after the Observation 2

[Judy] Sometimes my child cannot understand concepts or meaning. So, I tried to tear off papers to represent the concepts. And, I cut cucumbers to represent a fraction when he learned the fraction chapter. For example, during dinner time, I cut four cucumbers and asked many questions about fraction concepts by showing them. And, I used cucumber several times for meals. And, my child finally said, “Let’s stop eating cucumbers because we have tried and eaten cucumbers too much, and now I know a fraction.”

Extract 1.15 also shows mathematical competence-related code-switching and how a parent carefully monitored her child’s mathematical understanding and changed her language. Sun Hwa carefully looked at her child Ji Hoo’s angle measurement. And, Sun Hwa noticed Ji Hoo’s measurement had been mistaken. Because Sun Hwa recognized it from her mental math that contradicts the math fact that a line has an angle of 180 degrees (lines 14-16). And, Sun Hwa asked, “one hundred forty?” (line 3) in English. Then, she jumped in to intervene and remind her child the correct way, “Okay, are you sure? Wait for a second” (line 6). And, Sun Hwa specifically spoke in English to address the math fact in lines 14-16, “I thought the angle A [pointing it] and angle B [pointing it] should be one hundred and eighty [with the protractor].
Then, Ji Hoo noticed with her acclamation of “Oh!” (line 17) by looking at two angles on a line that aligned with a baseline of a protractor. Then, Sun Hwa takes this situation into making mathematical meaning for her child that she addresses the importance of double-checking (line 26). By addressing this, she also highlighted that not only relying on measuring the angle, but double-checking is also important such as the math factor, ‘a line has an angle of 180 degrees.’

**Extract 1.15**

*Sun Hwa, Observation 1*

Task: The drawing shows the angles a stair tread makes with a support board along a wall.

Use your protractor to measure the angles.

1. [Ji Hoo] This is going to be hard to measure….oh it goes [rotate protractor] one hundred and forty.
2. [Sun Hwa] Uh uh one hundred forty?
3. [Ji Hoo] Uh uhm
4. [Sun Hwa] Okay, are you sure? 잠깐만
5. Okay, are you sure? *Wait a second.*
6. …...
7. [Sun Hwa] Uh uh, can you read that? It’s one 염마가 왜 something wrong 어떻게 생각했는 지
8. [Ji Hoo] Um-hum
9. [Sun Hwa] One hundred thirty-five.
10. [Ji Hoo] Uh uh, can you read that? It’s one, *here is* One hundred thirty-five.
11. [Sun Hwa] Ok, are you sure?
12. [Ji Hoo] Um-hum
13. [Sun Hwa] One hundred thirty-five 염마가 왜 something wrong 이야기? 왜냐면 것은 I thought the angle A [pointing it] and angle B [pointing] should be one hundred and eighty. [with the protractor]
One hundred thirty-five *Do you know why Mommy said something wrong? Because I thought the angle A [pointing it] and angle B [pointing it] should be one hundred and eighty.* [with the protractor]

[Ji Hoo] Oh!

[Sun Hwa] 이 line에서. 와와. 엄마 생각했을 때는 여기가 equally 똑같다는 생각이 들었어. [with the ruler] 여기 그런 이야기가 나와 있나볼까?

Look at this line. *Mommy thought this part will be equally [as] the same [as on a line]*

[Ji Hoo] Oh!

…

[Sun Hwa] 맞아. 그래서 항상 기억해야 돼. 에는 조금 약간 이상하다 생각하면 double-check 하고.

That’s right! *So, you have to remember, when you think something is weird, then please double-check.*

As shown in Extract 1.16, Sun Hwa explained her language choice as Korean most of the time at home for her child. But, she tried to use English for important meanings or concepts in English.

**Extract 1.16**

**Debriefing Session After Observation 1**

1. [Sun Hwa] At home, I mostly use Korean for my child. However, when I think something has an important meaning, I try to explain it in English. Because I am concerned that what if she cannot understand it in Korean. So, for those important things or concepts, I try to use English. But, my child always responds in English
[because she is second-generation]. So, when my sister visited my home, she was surprised by looking at me and my child’s conversation. I am speaking Korean, and my child responds in English based on the understanding of my Korean speech.

**Cultural Negotiation**

The second chapter in finding still explores the first research question but focuses on cultural aspects. *How do Korean immigrant parents of elementary-aged students support their children’s mathematical meaning-making at home during the COVID-19 pandemic?* Not only code-switching, but Korean immigrant parents also tried to explain meaning or identities in different cultural contexts and languages. So, the second chapter of findings navigates how Korean immigrant parents, and their children jointly negotiate cultural and language differences in their interaction with mathematical meaning, concepts, and mathematics identities.

The ‘negotiation’ is the process by which two or more parties try to resolve perceived incompatible goals (Brett, 2000; Carnevale & Pruitt, 1992). Brett (2000) discussed inter-cultural negotiations that have cultural preferences, norms, priorities, and negotiation strategies as communicative preferences meet in the middle of a negotiation that deals with similarities and differences. In this study, which has a goal of mathematical meaning-making, I address *cultural negotiation*, which is the interaction with mathematical meaning, concepts, and mathematics identities being jointly explored in terms of different (and similar) cultures and languages. One of the negotiation strategies will be code-switching which changes the language that I discussed in the previous chapter. And, now this section focuses on cultural revision and mathematics identities negotiation for mathematical meaning-making. And, this section has a dataset of narratives of Korean immigrant parents and their children’s interaction when mathematical meaning, concepts, and mathematics identities are being jointly explored in terms
of different cultures and languages. This also gives ideas on how immigrant parental involvement strengthens or struggles in supporting children’s learning by sharing different cultural, national, and generational differences at the moment of learning. Parents' immigration to changed social location influences their children can experience two languages at home. And, if immigrant parents try to teach academic skills to their children, it is possible that children’s current curriculum and parents’ learned curriculums would be different since it also includes generational gaps and different cultural backgrounds. The participating parents tried to make a connection between their learned curriculum and their children’s U.S. mathematical concepts. Also, parents share their mathematics identities with their children while they are interacting with their children.

To address the cultural negotiation of participating parents, this section describes four parts: 1) Culture and language that discusses generational and cultural gaps, and language differences are negotiated, 2) Mathematics identities that include emotional tension between parents and children and how parents move forward helping children’s studying with praise, also parents naturally shared their mathematics identities with interaction that they value on-time efficiency, double-checking, and importance of learning mathematics, 3) Perceived smartness and model minority stereotypes, and 4) Lack information guided participating parents to seek information from the largest online community, Missy USA.

**Culture and Language**

Culture is not static; it is rather dynamically spread. Mathematics is also dynamic (Moreno-Armella et al., 2008). When participating parents explained mathematical concepts, they referred back to their learned curriculum decades ago in Korea. Correspondingly, there were
negotiation scenes in generational, cultural, and language gaps between immigrant parents and their children.

*Generational and Cultural Gaps in Korean and the U.S.*

Participating parents were educated in Korea several decades ago, so their learned curriculum will be different in generational gaps. And, they recall their cultural position, and they face U.S. math contexts and try to navigate factors to support their children by reactivating their background knowledge in the new country. This study does not aim to compare the US and Korean mathematics directly due to prenatal generation and their children navigating various factors including: time differences, generational curricula differences, values of Korean education, or linguistic differences.

Extract 2.1 shows both generational and cultural gaps between Korea and the U.S. that are negotiated in a mathematical conversation. In the U.S. curriculum, ten tables are introduced as the subset of five tables that highlight recursive number patterns. Lee Sang, the second-generation child, said that the number of stamps in the task will be the multiple of 5 by saying “at least five or ten” (line 3). Lee Sang wanted to say the multiplication table for five to discuss the number pattern and visibilities in five tables: Five or ten. But, her mother requested a further explanation about what that means by asking, “Wait, what does that mean? (line 5). Lee Sang mentioned the last digit number pattern “five or zero” (line 6) to say about the multiplication table for five. And, Judy figured out his meaning of saying multiplication five times table as one term [o dan] (line 7) that means five [o], table [dan]. Judy caught up Lee Sang was displaying the number pattern in the last digit number in the five times table in the U.S. This example is how conceptual and cultural visibilities are differentiated in culture and generation. Based on the mother’s learned curriculum and mathematical way of thinking, she relies on referring to the five
tables, not focusing on the number pattern of five or zero in the beginning. These short narratives touch on the differences that are negotiated and explored across nations of both Korea and the U.S., generations of age gaps, cultures of learned curriculum and the current U.S. curriculum, and languages in their interaction.

*Extract 2.1*

*Judy, Observation 1*

1. [Lee Sang] [Read the problem] Arthur has some stamps. If he gives each of his friends 3 stamps, he will have 8 stamps left. If he gives each of his friends 5 stamps, he will not have any stamps left. How many stamps does Arthur have? ... At least five or ten.
2. [Judy] 그렇지. 어, 무슨 말이야?
3. Right. Wait, what does that mean?
5. [Judy] 그렇지. 오단(o dan)에서 갖고 오는 거야. 그러면 he gives 3 개씩 줬다고 생각해 봤어. 그럼 left over 가 몇 개 있어야 돼? 3 개씩을 주고도 8 개가 남아야 돼네.
6. 여기서 세 개씩을 주고 나도 여덟 개가 남은 넘버를 찾아야지. 이해해?
That’s right. You may bring those numbers from the multiplication table for five. Then, he gives 3. Then, how many leftovers will be there? When you give 3 each, then you will have the remaining 8. Then, you should figure out how many when you give 3, then the remaining number will be 8 from the table. Does this make sense?

**Culturally Relevant Revision**

Mathematical meaning-making sometimes would be challenged by culturally unfamiliar stories or artifacts. But, those can be connected to culturally familiar forms. participating parents tried to improvise the cultural artifacts into more familiar forms for their children’s understanding of the math concepts. According to Herron et al. (2009), there could be several culturally relevant revisions for word problems to help learners’ understanding. And the cultural dimensions listed in the revision guide were: 1) names of students in class; 2) local settings (parks, stores, etc.); 3) games, activities, sports, or hobbies of students; 4) food or restaurants particular to the students; 5) names of family members or pets; and 6) special celebrations of the students and their families.

As shown in Extract 2.2, Judy’s immediate revision occurred that is connected to Herron’s (2009) fourth example of the food item. Judy who is an Analyst not working in the education sector showed the revision in guiding fraction concepts in interaction. Judy usually explained mathematical concepts and situations in word problems in Korean, and her child, Lee Sang, responded in English, but he understood her mother’s Korean language. In line 6, Judy switched the cultural food item *calzone* in a word problem of the fraction to *pizza* to explain the concept to her child. *Pizza* is a common food item in Korea these days, whereas *Calzone* is never discussed and served in Korean communities. The revision is not always revised based on Korean culture, but the familiarity of the learner is the key factor to revise in the learning phase.
Judy took advantage of improvising *cultural familiarity* which is accumulated exposure to the object (S. Jang & Kim, 2015). Although the cultural artifacts in a word problem are not familiar with the parent's experiences, the parent tried to employ her familiar form of artifacts to explain the mathematical concepts (e.g., fraction). The transition happened in a moment that connected to mathematical meaning-making. In line 16, Judy counted each piece in a pizza that she drew and explained about six people, and six pieces of pizza matched. Then, she explained the same procedure happens again in the next pizza to explain why each person receives two-sixth pieces of pizza (line 24), and one-third of the pizza (line 25). Although the cultural artifact is not the calzone, the mathematical meaning was delivered and Lee Sang had an aha moment (line 19) with the exclamation “Oh!”'. This shows he understood the mathematical meaning with his mother’s support with culturally relevant revision. This suggests that learners will take advantage of understanding meaning with culturally relevant revision, and educators would guide learners to share each other’s culture through mathematics.

*Extract 2.2*

*Judy, Observation 2*

Task: 6 sisters share 2 calzones. Each sister gets \( \frac{2}{6} \) or \( \frac{1}{3} \) of a calzone.

1. [Judy] 이게 뭐야, calzone 이 뭐야?. 피자로 한번 해볼게요 2판이 있어 [drawing two circles on the textbook]. 6명이 나눠가지려면 어떻게 해야 돼? 이거 6개로
2. two circles on the textbook]. 6명이 나눠가지려면 어떻게 해야 돼? 이거 6개로
3. 나눠서 한명이 가져가면, 6개로 나눠서 1명씩 가져가면 [drawing line on the
What is this, what is Calzone? Let’s try to explain this with Pizza. There are two whole pizzas. [drawing two circles on the textbook] What should you do if you want to share these with 6 people? If you divide one pizza into 6 pieces and one person will receive one piece from each pizza [drawing a line on the circle to be divided by six], as well as, the other pizza will be divided and shared by six. Does this make sense? Because there are six people.

[Lee Sang] Because it’s two.


[Judy] There are six people, one, two, three, four, five, six. Six people share two pizzas. Then you can divide one pizza into six pieces, then one person will receive one piece of one pizza [pointing to each piece of pizza]. And, there is one more whole pizza.

[Lee Sang] Oh!

[Judy] 그러니까 6개를 2개씩 가져가. 6개를 하나 take 하고 [from one piece of pizza which is divided by 6]. 또 하나 가져가는 거니까. Each person get two sixth

이 말은 즉, one third, 이해돼?

Then, one pizza divided by six, take this piece twice. Take one piece from one pizza, then take one more piece from the second pizza. Each person gets two sixths. This means, one-third, does this make sense?
Although mathematics is believed to be a universal language, mathematics requires a lot of understanding of academic vocabulary (Barrow, 2014). In the global society, mathematical meaning can be dynamically delivered in various ways of expressions, symbols, and various languages (Moreno-Armella, 2008; Kaput, 1999). And, mathematical representation would be different in culture. These cultural differences in curriculum might make parents get confused that making it hard to communicate mathematical meanings and ideas with their children.

Extract 2.3 shows cultural negotiation in meaning-making and shared her learned curriculum and experiences for her child’s meaning-making. In Korea, we say 각 (angle) and 각도 (angle measure). Admittedly, Sun Hwa was aware of the difference between two cultures and written representation. So, she said, she did not write $m$ in front of the angle measure (lines 21-22). When Sun Hwa noticed the $m$ in front of the angle measure (line 22), she took this representation to make a connection between her learned curriculum (line 23) did not have $m$ but now has it in the current U.S. curriculum.

Also, in the interview session, Sun Hwa was concerned about the lack of parental support in immigrant families might result in a greater gap among students: “I think the gap will be greater after the pandemic among students can receive parental involvement versus those who cannot receive those kinds of home support. Because some other immigrant parents who are very busy such as front-liners with their work might have not provided these kinds of direct support of explanations and communication with their children.” This suggests that supporting immigrant parents and providing resources from schools or communities would be beneficial to reduce the academic gap among immigrant families’ children. Whenever cultural differences exist, if those differences will be explained and communicated with their parents in their home, immigrant children’s mathematical meaning might enrich as an asset like Sun Hwa did in Extract 2.3.
Extract 2.3

Sun Hwa, Observation 1

Task: Find the measure of each angle. Label each angle with its measure.

1 [Sun Hwa] 그럼 문제가 읽어봐 왔어요. Number 4 다 써였어요?
2 Then please read this question. Number 4, what was that?
3 [Ji Hoo] [Read aloud problem #4] Find the measure of each angle. Label each angle with its measure.
4 [Sun Hwa] Ok, you are done with this. Then what is the number five?
5 [Ji Hoo] [Read aloud the number 5] Write the sum of the angle measures as an equation. 아무거나 써도 되나? Write the sum of the angle measures as an equation.
6 Write the sum of the angle measures as an equation. May I write down anything?
7 Write the sum of the angle measures as an equation.
8 [Sun Hwa] Sure.
9 [Ji Hoo] [whispering and writing the equation] three hundred sixty
10 [Sun Hwa] Yeah, mommy was right? Yes. ugh. This is three hundred sixty, right? You found it.
11 wrote the sum of the angle measures you may write a better answer like this [pointing to the above] above.
12 [Ji Hoo] Oh! [aha-moment]
Do you know what I mean? M, measure, I guess the meaning of the symbol m means a measure that is used in front of the angle sign. When I was young, I did not write letters in front of the symbol. Let’s try to write it down. WTX plus m angle sign...

[WTX plus m, angle sign. We did it.

Cultural Negotiation in Language Differences

The participating parents made connections from their learned curriculum and mathematical terms to U.S. mathematics during the interaction. Extract 2.4 shows cultural negotiation in different math terms in languages. Also, this shows bilingual learners do not naturally understand the different terms, rather there has been an additional effort from parents. Because this scene addresses cultural socialization from Judy’s learned mathematics and the current Lee Sang’s mathematical meaning-making. As shown in Extract 2.4, Judy read the problem and asked about the meaning of the improper fraction (line 4). After looking at the page with an understanding of its meaning, she introduced the term mixed number is called 대분수 [大分數] and the improper fraction is called 가분수 [假分數] in Korean. By referring to her own understanding, she explained both ways of converting saying, “I will show you the opposite way” (line 10) how the mixed number is converted to an improper fraction. And, also she showed how an improper fraction is converted to a mixed number to check the results are the same as the beginning number (lines 10-14). And, she explained how mixed numbers are converted to the improper fraction in Korean “these two numbers are multiplied, and the numerator is added” (line 13) by showing her calculation in Korean. Judy's interaction was interesting since most of her explanations about the converting procedures were Korean. Right
after this scene, Lee Sang understood the concept right away in Korean and performed well without making any mistakes.

Additionally, Extract 2.5 reveals Judy’s difficulties as a working mother to catch up with U.S. math terms such as “improper fraction” or “mixed number” in line 1. Judy confessed that U.S. mathematical terms are new to her. And, as a working parent, she could not monitor her children’s school learning all the time. So, it suggests that immigrant parents need additional resources about math terms for helping their children’s mathematical meaning-making.

Extract 2.4

Judy, Observation 2

Task: Convert the mixed number into an improper fraction (e.g., 2 ¼)

1 [Judy] Improper fraction 은 뭐야? 이거 해볼게. 이거는, 아까 금방 Lee Sang 이가 한 거는 이렇게 proper 하는 거야. 이제 대분수를, 한국말로는 대분수를.
2 가분수로 만드는 거야. [2 ¼] two times four [write multiplication symbol]
3 What is an improper fraction? Let’s try this out. This one as Lee Sang did one is a proper fraction. But, now you may change a mixed number, in Korean 대분수 [mixed number], to 가분수 [improper fraction]. [2 ¼] two times four [write multiplication symbol]
4 symbol
6 Nine divided by two, eight 이 남아서 one 이 남아서, 그래로 가는 거에요. 거꾸로 가는 거에요. 엄마가 빌리 보여준 거야. 여기 말에는 꿈하고 더하면 되는 거네.
Two, four the denominator stays the same? I will show you the opposite way. Nine
were divided by two, eight were made, and one was added. Four is the same. I showed
how you can go back to make a mixed number from an improper fraction quickly. To
make an improper fraction, these two numbers are multiplied, and the numerator is
added.

[Lee Sang] Ung.

Extract 2.5

Judy, Debriefing Session after Observation 2

[Judy] I didn't know the [English] terms like “improper fraction”, or “mixed number”.
Actually, previously, when Lee Sang was in class I was always next to him by
monitoring and listening. But, recently, I was too busy because my job had more work
to do, so I couldn't do that now. I have three children. Originally, we sat together, and
my children took their online classes at one table under my supervision. I kept
watching their classes, so I could watch and figure out my children’s struggling parts,
and weaknesses. But my company was getting too busy, so I made a separate desk in
my room and couldn't see their class.

Immigrant children might make mistakes when they read the mathematical symbols
based on their parents’ culture and language expressions. That might influence their
communication about a mathematical conversation in classrooms. Thus, educators might be
aware that language and cultural differences are connected to those expressions and
conversations.

Extract 2.6 shows how language and culture make conceptual differences in mathematics
learning. In Korea, the way of speaking of the fraction is in the opposite order: the denominator
first, the numerator last. In Korea (and this also is the same in Japan and China), the denominator [분모, 分母] means a parent, and a parent piggy bag for a baby. so the baby is a numerator [분자, 分子]. To say one-twelfth, we say twelfth one in Korea. Because in Korea, we say the number of the denominator first, 분의 (booni--meaning of divider), then say the number in the numerator. For example, twelve, Booni, one. But, In the U.S., people say one over twelve. So, to explain improper fractions, Korean people explain that a baby is bigger than a parent.

These cultural and language differences might make a confusing math expression for the child, Min Hwan. Min Hwan is 1.5 generation immigrant since he came to the U.S. when he was seven years old. He said the 1/12th as the twelfth one (line 8) in the Korean way of reading order. Then father Seong Chan noticed this from language and cultural differences, so he corrected directly after Min Hwan. Initially, Seong Chan and his child Min Hwan explored to find a common denominator to solve a fraction addition problem. Seong Chan reminded this by providing a problem. And, when he tried to explain a fraction, his son Min Hwan read the fraction in an opposite way which is a Korean expression. Although Min Hwan understood the concept, his expression could be a reason to make mistakes. So, his father directly corrected it and moved forward.

*Extract 2.6*

*Seong Chan, Observation 2*

1  [Seong Chan] [writing a question] 이거를 찾는 연습을 했었거든. fraction 할 때

2  You practiced finding a common denominator when you learned fractions.

3  [Min Hwan] 네.
Yes.

When you do one over eight, one eight plus... Min Hwan if you add.

Twelfth one.

One twelfth. [correcting]

Then, the common denominator will be 24. No need to find 96...

Then you don’t need to go further [than 24] like that. Father wanted to say that. You know it already, Min Hwan.

### Mathematics Identities

The second part of the cultural negotiation of mathematical meaning-making is that Korean immigrant parents’ narratives came across their identities in mathematics education. Korean parents praised and dealt with emotional tension between children. Also, Korean immigrant parents valued time efficiency, double-checking, and the importance of learning mathematics as one of the fundamentally important subjects that can be applied to various areas.

**Emotional Tension and Praise.** Most teachers might have experienced distracted students in their classrooms (Rosen, 2017). Likewise, distraction or physical tiredness were challenging parts of mathematical interaction between parents and children. However,
participating parents put effort into their child's mathematical meaning-making even if they face difficult moments with their children to help children’s learning. This betrays a common misconception that Asians are too much evolved figures (Shah, 2019). Rather, my data also suggests that Asian students are not inherently good at mathematics. Rather, we cannot neglect parental involvement that they are working on emotional tensions with rewards, praise, and motivation.

Extract 2.7 addresses that a parent persistently support their children although they are tired, distracted, and sometimes make mistakes. Sometimes, Jake was distracted by the other factors going on around him such as thinking about board games or talking about free time, or he mentioned that his brain is burning due to the learning. As shown in Extract 2.7, Jennifer suggested a competition (lines 3-4) between the mother and her child to solve the problem by himself. However, Jennifer’s child Jake complained about his tiredness (lines 6-8) during the observation sessions. Jake was distracted by his fatigue (lines 6-8), “The liquid inside in my head splashing out and falling...The liquid in my head is hot.” But, Jennifer kept encouraging his math work to quickly finish up the day’s goal; her mathematics identities value “time efficiency” and “independent problem-solving” (lines 17-19). And, she praised her child’s mental math (line 23) and kept working on the tasks (lines 23-27). This suggests that Jennifer’s mathematics identities are negotiated in tension and praise.

*Extract 2.7*

*Jennifer, Observation 1*

1. [Jennifer] 이렇게 문제가 여덟 개까지 있어. 좋아 우리 Jake 시합해 볼까. 누가 더

2. 빨리 꾹눈가 엄마 오늘 밥 너무 많이 먹어서 머리가 잘 안 돌아가네요.
There are eight problems. Then, Jake, let’s compete with me who solves faster than the other. Your mommy ate too much dinner this evening, so my brainwork is slow now.

Me, too. My brain, brain, brain hurts. It seems to burst out.

The liquid inside like…The liquid inside my head splashed out and fell...The liquid in my head is hot.

I see. Let’s try to solve number A. 2 times five times eight. Let’s try this one. You solve it. You can solve it from that side. I will solve it from this side.

Now, the liquid in my head is hot which is burning my knowledge.

너 이런 식으로 하면 시간이 너무 많이 가서 나중에 피곤해지는 거야.

I see. Jake, did you solve it in your brain? [laugh] Wow, my Jake, I just began calculating this. Jake, you solved it in your brain? Great job. Let’s try the other one?
[Jake] Forty.


Wow, Jake, you did an excellent job.

Extract 2.8 shows parents are also negotiating their emotional challenges when their child’s undesirable mathematical performances happen. Since mathematical meaning might need applying mathematical concepts through practice, there could be these kinds of mistakes or misunderstandings. When a child cannot understand mathematical concepts or make mistakes undesirable for parents, parents might experience some emotional tension as a challenge. Lee Sang was good at understanding most of the concepts. But, sometimes he also made mistakes unexpectedly. Judy explained the math fact (lines 6-9), that the cross canceling cannot be done on the same line (e.g., numerator and numerator; denominator and denominator). However, Lee Sang thought the nine and three (numerator and numerator) on the same line can be cross canceled. So, Judy reminded her son, by saying “Pull yourself together!” (line 12). Although the child is good at performing mathematics, he also makes mistakes sometimes. So, Judy reminded him of his mistakes.

Extract 2.8

Judy, Observation 2

Task: $\frac{9}{10} \times \frac{3}{4}$

1. [Judy] [Task 1] simplify 되는 거 있어 없어? [drew the crossed x-shaped line]

2. *Do you see any possible things to simplify?* [drew the crossed x-shaped line]
Some people mistake 할 때: “이거 one, one [pointing to the same line]하는 거 되는 거 아니에요?” [라고] 해. [은데] 안 돼. 이거 어차피 같은 line 으로 같이 multiply 하기 때문에 simplify 할 필요 없는 거야.

Some people [make] mistakes say like this: “This one, one [pointing to the same line] can be simplified, right?” [but] No, you can’t. This will be on the same line, they are multiplied together. So, we don’t need to simplify on the same line [denominator and denominator, numerator and numerator]

[Lee Sang] Let’s cross this out! [9/10 x 3/4]


Ugh? Pull yourself together!

Extract 2.9 shows a rapport between a parent and his child. A father, Seong Chan, suggested to his child to check whether his own problem-solving is correct or not (lines 3-4). But, Seong Chan’s child automatically said, “You are my father, so your way will always be correct” (line 6). This scene suggests that parental involvement is built on a strong relationship with their children. Not only working on mathematical meaning, but a father was also adding relational depth in his interaction with his child. Seong Chan has his career as a store manager, but he set additional time for his child’s mathematical meaning-making. At the same time, this suggests that the building routine of mathematical home support requires a lot of effort such as parents should build an emotional bond, encourage the child can overcome tiredness, set additional time to work on, and try to make a connection between their learned curriculum to his child’s current U.S. curriculum.

Extract 2.9
Seong Chan, Observation 2
With father, let’s solve this out. For this one, I will solve it. And, please monitor if my problem-solving is correct or not.

Okay... You are my father, so your way will always be correct.

No, father, a father will be wrong. Min Hwan, you may jump in when I make mistakes.

Extract 2.10 shows parents’ mathematics identities and values might face challenges with a child’s way of solving problems. In a rising 6th grade, Aspen was more mature and preferred her independent problem-solving (line 5) compared to other participating children. In interview sessions, Ashley mentioned that pointing out her child’s mistakes is a little bit challenging for her and her child because of her child’s age group as teenagers. Because sometimes her child might take a mother’s error correction as nagging. Aspen is an advanced learner in mathematics, however, she sometimes made mistakes in mathematics problems. And, Ashley pointed out, that errors are sometimes caused by mental math (line 17). Ashley tried to change her child’s habit of making mistakes in problem-solving. This suggests that parents should also take care of the relationship between their children, and also figure out mathematical error patterns and try to find alternative ways to overcome them. Compared to other parents who value mental math (Jennifer and Judy), Ashley put priority on rigor and does not use her brain (lines 17-18) in avoiding mistakes. This might be because Aspen is a rising 6th grader and working on advanced-
level mathematics. Also, Ashley is concerned about keeping her child motivated. During the interview sessions, she shared her current concern for her teenage child in terms of rewards for participating in home studying.

*When your child is young, just one candy can become a reward for her. However, if your child gets the highest grade in elementary school, the reward is not a reward for her. My child does not need anything. And, she is sophomoric now.*

In Korea, people call the teenager’s independence increasing period as called a sophomoric illness (중 2 병). Ashley’s narratives remind us of parental involvement in academic progress is not easy as tiger parenting suggested. Taking responsibility who guiding a child’s needed areas, Ashley dealt with those tension in her best way as a great mother.

*Extract 2.10*

Ashley, Observation 2

1. [Ashley] $4 \times 2 = 8$, $4 \times 3 = 12$ 아니야, 이거 아니야. $2 \times 3 = 6$, $2 \times 2 = 4$. 2x 그
2. 다음에 minus 사, plus three minus 2, plus 1.
3. $4 \times 2 = 8$, $4 \times 3 = 12$ isn’t it, this? No. $2 \times 3 = 6$, $2 \times 2 = 4$. 2x then minus four, plus three minus 2, plus 1.
4. [Aspen] [silently solving the question on the next page by herself] Umma, I got my answer.
5. [Ashley] That’s not correct at all. 아니에? x 를 다 넣었어? rx minus minus… x plus
6. 옛고 진짜 minus 야? minus 8x, 8x 없어지고, 이거 이런 거 진짜 실수할 거야? 8x
7. minus plus x minus 2x 이거는 진짜 너무 애기들 거 아니니 이거. 그래서 어떻게 해야 돼? 응, 몇 x 야?
That’s not correct at all. That’s not right? Did you work on all $x$? $Rx$ minus minus… $x$
plus, then was it really minus? Minus 8$x$, 8$x$ is crossed out. Like this, do you make this
sort of mistake? This is not an advanced level, like this. So, what should you do?
right? What $x$ will come?

[Aspen] 4$x$, mom?

[Ashley] 그러니까 아빠가 계속 너보고 암산하지 말고 적으라고 하지.

So, your father told you not to do mental math, but please write them down. [to avoid
making mistakes]

**Time Efficiency.** Valuing on-time efficiency might be a controversial issue in U.S.
mathematics (Boaler, 2015). However, in Korea, time efficiency is one important factor to
prepare for a mathematics exam. Like the Korean SAT, which is held only once a year, and is a
high-stakes test, it has a very strict schedule that gives the same opportunities to all students.
Accordingly, mathematics assessment is bounded within a certain timeframe. By referring to his
own experiences, Korean parents might share indirectly their own mathematics identities.

Extract 2.11 shows mother Jennifer is sharing her value of on-time efficiency in problem-
solving including encouraging mental math without writing specific procedures in problem-
solving. Jennifer suggested finishing the task quickly by suggesting a competition between her
and her child (lines 3-4). Then, Jake followed his mother’s directions and showed his mental
math (line 5). Jake showed his mental math several times in observation sessions, and Jennifer
praised his mental math.

*Extract 2.11*

*Jennifer, Observation 2*
Let’s try this one. I will also try it. Let’s compete to see if Jake is faster or mommy is faster.

Similar to Jennifer, as shown in Extract 2.12, Judy’s mathematics identities address her values of on-time efficiency in problem-solving as one form of her mathematics identities, and that is also shared with her son, Lee Sang’s meaning-making. After listening to Lee Sang’s correct answer to the first problem on the page of the workbook, Judy encouraged Lee Sang to keep calculating with fast problem-solving (lines 6-7). Not too much thinking about how to make an improper fraction from understanding the situation of the word problem, she guided him to automatically look at only numbers in the word problems and simply apply the same procedures to save time (lines 6-8).

Extract 2.12

Judy, Observation 2

Task: Convert the mixed number into an improper fraction (e.g., 2⅛)

1 [Judy] 맞나 한번 네가 divided by 해봐.
2 You may check. You can divide by.
3 [Lee Sang] [read aloud and write] Twenty-five, eighth [25/8].
4 [Judy] 이렇게 나왔어. 그럼 맞는 거지. 네가 앞으로 와도 그렇게 빨리 나오면.
5 이런 거는 시간 낭비할 필요가 없어. 바로 바로 산수할 수 있는 거잖아. 그치?
So, you got an answer. That’s right. So, it is simple, so you don’t need to waste time on the rest of the tasks. You may calculate it right away by looking at only numbers, right?

[Lee Sang] [silently write down the answer for each question on the same page]

Extract 2.13 also shows a simpler way that helps time efficiency in mathematics is valued by participating parents. Seong Chan monitored his child’s line-by-line justification (lines 14-20). And, he noticed extra steps that can be shortened and addressed those two steps are longer than his way (lines 17-19). To highlight these efficient ways, he also used code-switching: “simplify” (line 16), Two sixteen by sixteen (lines 19-20). And, he explained that cross-canceling could have saved the procedure (lines 25-26). But, Seong Chan also admitted that longer problem-solving is also correct, but he just wanted to let his child know about saving procedures (lines 31-32). Seong Chan’s monitoring procedure was connected to delivering his own math identities and values to his son. Because his message of valuing saving time and increasing efficiency is clearly delivered to his son during practicing mathematics. This suggests that identities from parents are engrained in his son with meaning-making as cultural socialization in a Korean immigrant family.

Extract 2.13

Seong Chan, Observation 1

1 [Min Hwan] [read aloud his procedure]

2 [Seong Chan] 와 잘했어, 잘했다. 잘했다. [clap clap clap] 완전 잘했다…

3 Wow, great, great, great. [clap clap clap] You did a great job.
Min Hwan, sit tightly. Here, one thing a father can work on together is, Min Hwan, 7th 2, 2 and 7, seven seconds [7/2] this one, you changed this one [finding a mixed number], but for the next step, there come numbers that can be simplified together.

Right? [saving procedures] So, Min Hwan, you may see you did two steps longer. If you did not make the mixed number and let it be, the next step, you could simplify everything together. But, Min Hwan, you couldn’t do cross-canceling. And, here, too.

Two sixteen by sixteen?

[Min Hwan] [noticed something] 여기서 그냥..
Here, **sixteen, sixteen** cross-canceling can be applied then the next number directly comes out here.

[Min Hwan] Ah, okay. [trying to erase all his writing]

[Seong Chan] 아니 지울 필요 없어. Min Hwan 이가 한 것도 맞고 아빠가 한 것도 맞는데 아빠가 얘기하는 거는 한 단계를 더 줄일 수 있는 방법을 알려줄 거예요

맞지?

No, you do not need to erase all these things. Min Hwan, you are right, too. I am right, too. But, I just said how to save the procedures, right?

[Min Hwan] 맞아, 맞아요.

Right, right.

**Double-Checking.** Korean parents put a value on the accuracy of problem-solving (Leung, 2008). This is connected to pursuing rigor in mathematics. This might come from East Asian cultural and historical background (Leung, 2008). Making mistakes can influence university admission or a long-term life career (e.g., Korean SAT or officer recruiting exams). And, with the high competition in a large population in a small country that did not generously allow for a second chance.

Extract 2.14 shows that Sun Hwa addressed the value of double-checking (line 4) in measuring an angle while referring to math facts. This excerpt is part of Extract 1.15 that was already discussed in mathematical competence-related code-switching.

**Extract 2.14**

Sun Hwa, Observation 1
That’s right! So, you have to remember, when you think something is weird, then please double-check.

Extract 2.15 shows Seong Chan’s value of double-checking in problem-solving. Seong Chan kept trying to remind his son of the value of double-checking. In line 21, Seong Chan said, “So, you need to know about the reasons for making mistakes. Then, these sorts of problems will become your strength.” This is a growth mindset of his mathematical identities: learning from mistakes. This scene was meaningful, not only ingraining the habit of math study as a way of cultural socialization, but he also gives a positive mindset of changing his son’s weaknesses into strengths. Min Hwan is a rising 5th grader, and Seong Chan and Min Hwan are continuing home math studies. Seong Chan’s mathematics identities were revealed in interview sessions that showed the value of rigor in problem-solving of each step. In the debriefing session, after observation, Seong Chan highlighted the importance of the rigor of problem-solving.

“I told this to Min Hwan several times, referring to my own experiences in schooling. Min Hwan knew how to solve the problem. However, making a few mistakes guides the wrong answers. For example, he makes mistakes in some steps in arithmetic operations even if he understands the complex process. So, I tell him that please do not need to stop making light of these steps.”

Extract 2.15
Seong Chan, Observation 1

[Seong Chan] 왜 답은 three/fourth 라고 써들은까요?
Why did you write the answer three-fourths previously?

[Min Hwan] umm...

[Seong Chan] 이해가 안 되죠. 약간 그. 그러니까 문제를 풀고 난 다음에 이렇게 검사를 하면서 다시 double-check을 할 때 민찬이가 어느 부분에서 틀렸는지 그리고 어느 부분을 어느 부분을 틀렸는지를 민찬이가 확인을 하면 민찬이 약점을 알 수가 있어요. “내가 이런 부분을 이렇게 쉽게 틀리게 계산하는구나” 이런 거를 알 수가 있어요. 그래서 민찬이가 이런 답 민찬이가 지금 풀 답하고 아빠는 이 3이 맞거든. 지금 풀 이 답이 맞거든. 그러니까 민찬이가 지금 이거를 문제를 모르는 게 아니야. 우리 민찬이가 이 문제를 모르는 게 아닌데 답을 틀리게 썼죠. 그러면 답을 틀리게 쓴 이유도 있을 거라고 생각을 해요. 그러니까 고를 민찬이가 또 알아야 돼요 그래야 약점을 알아야 약점을 바꿀 수가 있습니다.

You don’t understand why you put that answer previously. For that, so, when you solve a problem, then you should check the problem-solving again. When you double-check, then you may figure out which parts you made mistakes and you will know your weakness. You will see “I made these sorts of parts.” you will figure this out. So, Min Hwan’s current answer and my answer are 3, that’s correct. Now, your solved answer 3 is correct. So, this shows that you do know how to solve this. My Min Hwan, you made mistakes. So, there could be reasons that you made these mistakes. So, you need to know the reasons for making mistakes. Then, these sorts of problems will become your strength.
Extract 2.16 shows how mathematics identities on rigor are negotiated with Ashley and her child, Aspen, in mathematical meaning-making. By checking her daughter’s mistake, Ashley suggested “Please don’t forget to write any part of the equation (line 4). By checking detailed problem-solving, Ashley highlighted the rigor and not missing any parts in problem-solving. As a rising 6th grader, Aspen is already working on pre-algebra with her mother. And, based on that, the tasks are getting more complicated and require rigor in the procedure. And Ashley cared for that part to make it perfect.

Extract 2.16
Ashley, Observation 1

1 [Ashley] 좋아. 제발 빼먹지 말아줘. 아까도 숫자 하나 6 하나 빼먹어가지고 다
2 맞은 거 틀리고. 그다음에 여기서도 T 제곱.. cause minus seven T. Seven 안에
3 seven 을 안 넣어가지고 틀리면 어 textStyle. 
4 Great. Please don’t forget to write any part of the equation. In the previous task, you
5 missed writing a number 6, your problem-solving was almost perfect except for that
6 missing part. Then, here also, squared t ... cause minus seven T. Seven is in front of T,
7 but how didn’t you put seven, so you missed this problem.

Importance of Learning Mathematics. During the interaction, some parents naturally shared the importance of learning mathematics with their children. Sun Hwa and Seong Chan asserted that mathematics is one of the fundamentally important subjects that can be applied to various areas in our daily life including STEM areas. Sun Hwa gave an example of the application of geometry when she introduced angle measurement. Seong Chan explained it when he explained the order of operation. By sharing the importance of learning mathematics, parents guided their children in understanding the value of mathematics.
Extract 2.17 shows Seong Chan’s mathematics identities of the importance of learning mathematics are discussed within the meaning-making. During the interaction session about the order of operation, Seong Chan explained the importance of learning order of operation and mathematics (lines 1-4). He said, “Mathematics is a fundamental subject that can be applied to other subjects” (lines 5-6). He reminded Min Hwan about the importance of mathematics.

**Extract 2.17**

*Seong Chan, Observation 1*

1 [Seong Chan] The reason why Min Hwan is learning to add, subtract, multiply, and divide is that you are learning this now to calculate all of that, and to do that you are learning the order of operations now. You need to know what to calculate first and what to do now. And, why do you think I'm learning math? You need to know why you are learning this calculation and math. Mathematics is a fundamental subject that can be applied later when you learn other subjects like Science, Physics, Chemistry, and so on.

Extract 2.18 addresses how Sun Hwa shared the importance of learning mathematics and makes connections in daily experiences that help a child's understanding of making meaning in mathematics. This scene suggests that parents' involvement can contribute to one’s long-term mathematics identities and helps to keep working on the subject.

Before jumping into explain about the angles, Sun Hwa asked about the reason for learning angles to Ji Hoo (lines 3-4). And, based on Ji Hoo’s answer (line 5), “When you make houses, you have to calculate” Sun Hwa makes a connection that the learning angle is important with bringing a mug cup (lines 21-24) as an artifact. She discusses about mathematical beauty is important based on people’s perceptions and that builds our lives. Though this Sun Hwa
naturally shares the importance of learning angles that can be connected to a future career or high school projects (lines 32-36).

*Extract 2.18*

*Sun Hwa, Observation 1*

---

1. How do you think we should learn about angles? Have you ever thought about that?
2. Or, should you use it or apply it for something?

---

Ji Hoo] When you make houses, you have to calculate.

---

Sun Hwa] angle 은 왜 배우는 것 알아? 생각해 본 적 있어? 아니면 네가 use 할

그럼 apply 할 일이 있나?

---

How do you think we should learn about angles? Have you ever thought about that?

Or, should you use it or apply it for something?

---

Ji Hoo] When you make houses, you have to calculate.

---

Sun Hwa] angle 필요하지. Uh uh 와와 진짜. 자기 어디야. John Hancock Center 같은 거 지울

때 John Hancock Center 같은 거 약간 slightly [drawing a tilted line] narrower on the
top, 근데 이 angle 이, angle 이, 정확해야지…그리고 사람들은 항상 balance 를

좋아해요. balance 그게 아름답다고 생각해.

---

Oh, you're right. When Architectures, and carpenters work, architects should measure angles. Uh uh. Let’s think about it. There, when people build like John Hancock Center, it has slightly [drawing a tilted line] narrower on the top. But the angle, the

angle should be correct… And, people like balanced shapes, and believe balanced

shapes are beautiful.

---

Ji Hoo] Of course they do.
So, as Ji Hoo mentioned earlier architecture, look at this cup, look at the shape of this cup. This looks like. This cup, and mommy’s cup looks like this. But, usually a mug cup looks like this and has the same lengths of top and bottom.

This one is greater than.

However, this cup has a wider top [than the bottom] ...So, architectures, or designers use a high-functioning professional protractor and rulers. I bought a basic protractor for this chapter, but there are much better ones. So, you need to learn the basic things.

Because you might have related jobs of learning this, or if you design your things when you go to high school.

Perceived Smartness and Model Minority Stereotypes

Asian students are good at mathematics rhetoric is a prevalent myth (Shah, 2019). It is
sometimes even a threat for children who are not good at mathematics. This might be additional pressure on Asian parents to provide additional parental involvement at home to help their children can understand mathematical concepts. In terms of “Asians are good at mathematics,” parents admitted they see Asian students are seen in advanced level mathematics classes. Participating parents’ narratives show how Korean immigrant parents are assessed and valued by themselves and others with the model minority stereotypes.

Among participating parents, there was not a clear consensus on whether Asians are good at mathematics or not. From their experiences, they shared those Asian students seem good at math at elementary school to their children’s classmates. For example, Seong Chan mentioned that “Indian students’ and Korean students’ brains are smart since they are good at mathematics at school.” However, Jenifer, Sun Hwa, and Ashley mentioned that Asian parents’ involvement influences the students’ mathematics performance. They shared that Asian parents’ cultural identities become one of the factors to shape parental involvement that guides students’ understanding of mathematics.

The perceived definition of ‘smartness’ was different from parents’. According to Hatt (2012), smartness is a cultural practice in schools by employing Holland’s figured world that smartness is determined by the relationship between power. Smartness is contentiously perceived as innate versus nurtured. Korean immigrant parents provided several reasons for Asian students’ representation in advanced level math classrooms: parental involvement, cultural backgrounds, or brain.

Korean immigrant parents’ narratives aligned with Yan and Lin (2005)’s results of parental involvement and high expectations helped children’s understanding of mathematical concepts. Jennifer said Asian students are seen in GT classes and normal math classes, and she
provided its reason from parental involvement. Since she is listening to Jake’s math classes next to him, other Asian friends confessed during the mathematics classes, “I learned this from my parents at home.” This suggests that although there are prevalent misconceptions about Asian students being inherently good at mathematics, parents put additional effort into their children’s mathematics education. Like Jennifer, Judy said, from her observation, Asians are good at mathematics in her child’s classroom. Sun Hwa said, Asians are good at mathematics, but their parents are putting that effort and teaching at home. Also, she thought maybe it could be cultural influences from history, too. Seong Chan and Hyeon Ji said Asian students are good at math thinking the smart brain with cultural influences will be one possible reason, considering Indian Students and Korean students’ mathematics performances are good at schools. Ashley shared her opinion that elementary students are good at math owing to parental support. However, for the advanced level, Ashley believed it is more challenging for Asian immigrant students due to cultural and linguistic differences.

Taken together, from the surface level of observation, Asian students seem good at mathematics. However, Korean immigrant parents commonly mentioned the importance of parental involvement for those students who are good at mathematics. Nonetheless, Asian students are perceived as inherently good at mathematics, this could be problematic. Because of invisible parental involvement and their additional effort at home, this study shed light on their negotiation and identification of themselves.

**Model Minority Stereotypes.** As Wing (2007) discussed, Asians are viewed as good at mathematics, and model minority groups. Ashley pointed out some model minority stereotypes related to microaggressions in her child’s classroom: Not calling their children’s name during math classes. She understood that her child’s teacher wanted to give opportunities to those who
are not good at mathematics, but her child was so good at it. But Ashley is also concerned that Korean American students are educated to become more passive learners.

Microaggressions are minute discriminations that give negative messages reminding people of color that they belong to a racial minority group (Sue et al., 2007). Although the racial microaggressions were discussed about African Americans and Latin@ population, Sue et al. (2007), addressed model minority stereotypes disguise the existence of the microaggression toward the Asian population. For example, some people might ask a second generation Korean American, “Where are you from? Your English is perfect.”

Extract 2.19 shows that model minority stereotypes might give students challenges. As an educator, Ashley understood the teachers’ perspectives that they try to give opportunities for a lot of students trying to include students (lines 7-9). But her child felt that a teacher’s call was more frequently given to European Americans, and finally, her name was not called although she raised her hands. Ashley’s narratives illustrate Sue et al.’s (2007) earlier argument about the model minority stereotypes can be applied as a form of microaggression for them and challenges belonging to Korean immigrant children.

*Extract 2.19*

1  [Interviewer] Have you or your children ever thought or felt yourself as a minority?
2  [Ashley] I think that I educated my child to have an awareness about racial
discrimination and shared if there is a concern or experience please share them with
me. Then, one day, my child said, “My teacher, she did not call my name because I’m
Korean”.
3  [Interviewer] Oh, she didn't call your children’s names?
[Ashley] Yes. For example, during the classes, students raise their hands. I totally understand the teachers' perspective. If 10 students raise their hands at the same time, then a teacher should point one out of those 10 students. But, my daughter thinks, that if she always raises her hands, then other students are called their names, but they are all European Americans. So, she might have felt some, and she thought and told me after school, “She didn’t call my name because I’m Korean.” My neighborhoods have Asians 20 percent or 30 percent, which means there are a lot of Asians compared to other districts. But, still, here she felt that she was not given the opportunity [racial awareness].

Extract 2.20 shows that participating parents perceived the lack of the same Korean American teacher or Asian American teachers might weaken students’ belonging. Ashley suggested the reason might be teachers’ race, “The same Korean race teacher or Asian teachers would be more comfortable to speak with. I volunteer to teach some Korean American students group. And, a boy is very talkative during my lessons. However, his mother worried about he does not talk a lot during his schooling. I felt that he more felt similarities and comfortable belonging from same Korean race teacher like me.” And, she pointed out that teachers also feel more comfortable talking with children of the same race since they share similar cultural backgrounds. She strongly asserted that “She really is not passive” (line 4). But, Aspen’s strategy to not actively participate in lesson activities is more like a coping strategy of being self-silenced (Choi & Lim, 2014) in recursive experiences as being seen as model minority students. Ashley suggested that one possible reason is having 90 percent, White teachers, although the school district has 20-30 percent of the Asian population. The call-out was more given to the White students. And, she said that students with teachers of the same race can easily talk to their
teachers (lines 23-24). This suggests that a low number of same-race teachers in the diverse school districts may influence their children’s belonging in the classroom. Echoing these narratives, teacher education programs could recruit more diverse teachers who can become same-race teachers for underrepresented learners. Also, teacher education programs should actively educate future teachers to have a strong understanding of supporting immigrant families' children and demystifying racial myths among students.

Extract 2.20

1 [Ashley] [During the pandemic] I could observe her remote classes at home. My
dughter did not obviously lead the discussion and interaction.

3 [Interviewer] Is it because your child is a little passive? Or…

4 [Ashley] [My child] is not passive. She really is not passive. The school districts
include about 20% to 30% Asian. I don't know if it's because my child is very sensitive
to racial discrimination. But, almost 90% of the teachers are White.

7 [Interviewer] Oh! I see.

8 [Ashley] But, I don't blame teachers, I think communicating with the same or similar
students is kind of natural since I think it's a common characteristic [of people]. They
give opportunities to children who are similar to them, and people with similar cultural
backgrounds are more comfortable, so I feel those things are unavoidable to consider.

12 [Interviewer] Yes, that's right.

13 [Ashley] So, I think Asian children become more passive at schools, and I believe
Korean American students are educated to become passive learners. Now, they are
seen as compliant with authority. I guess this might have been considered as cultural
things like emphasizing filial duty from when we were young. However, I have seen
[as an educator] a lot of cases, it’s been educated within our school system. Some students were really good at talking voluntarily during classes at school [in elementary and middle school], however, when they grow up, they have become, more, more, more, more passive and didn't talk at all in high school.

[Interviewer] Do you mean it could be affected by teachers’ race, right?

[Ashley] Of course! Of course!... White students can easily talk to White teachers, Black students can easily talk to Black teachers.

Extract 2.21 shows that parents' desire for their children to belong guided them to put effort into supporting mathematics. Jennifer shared her wish, (lines 2-4) that her children will have strong roots in this country. Being an immigrant who came from other countries, Korean immigrant parents’ wishes guide them to help their children to belong to a new country.

Extract 2.21

Jennifer-Roots in the New Country

[Jennifer] Immigrant families do not have strong social capital in the U.S. like having strong roots or strong backgrounds in this country. I wish my children can have strong roots in this country from now on by having strong educational backgrounds. By having a good career with a strong education, immigrant children and the next generation will overcome their marginalized status in the long-term period.

Lack Information, Seek Information: Relying on Missy USA

Last but not least, participants shared their concerns about the lack of information about supporting their children’s education and understanding of mathematics. participating parents perceived their immigration, shifted social location, created not only created a physical distance from their home country but also made them less educational resources and information from the
mainstream society without less belonging. Finding disconnectedness from mainstream society, Korean immigrant parents try to find relevant information from the largest Korean online community, Missy USA (Oh, 2016). Three participating parents, Jennifer, Sun Hwa, and Ashley shared their less information about supporting their children’s mathematics education. And, they commonly shared the reason to come to Missy USA was to find information about their children’s education.

Missy USA is a great location for Korean immigrant parents. However, this suggests the lack of information from the direct local communities or schools. The changed social location gives a burden on finding information for their children’s educational needs as a newcomer. But, all five participating parents mentioned that they are not receiving any face-to-face support from their local community including in the pre-pandemic era.

Extract 2.22 shows that Jennifer found the information about children’s workbook selection from Missy USA (line 5). Rather than meet people in nearby communities, she searched for her most needed information from Korean online communities. Her reasoning for not highlighting advanced levels of mathematics (line 4) contrasting to other Korean immigrant parents who pursue advanced levels of mathematics education such as Olympiad preparation (line 4) was revealed about her previous experiences.

**Extract 2.22**

*Jennifer’s Experiences in Missy USA*

1 [Interviewer] Jennifer, did you receive any support for your children’s education from any communities like Korean communities, or local communities? If so, which are communities that you received support from?
Jennifer] I did not need so much information because I was not interested in preparing my children for the mathematics Olympiad...So, I did not seek help from communities, but I searched for information in Missy USA about which workbook is good for home studying.

In Extract 2.23, Sun Hwa confessed comparably difficult to find information about education in the U.S. This feeling of lack of access to information might be related to referring back to living in Korea, because of the size of the country, everything is close. Accordingly, parents in Korea easily can seek information about education from teachers, experts from cram schools, private tutors, or parental communities (e.g., live in the same apartment complex). Similar to Jennifer, Sun Hwa mentioned that Korean parents’ information and resources about education are limited compared to existing Korean cram school streets (line 1) since it is hard to find the cram schools in her neighborhoods in the U.S. And, she pointed out that she feels that she has limited information or access to find great tutors since she is a Korean parent (line 3). Due to the limited access, Missy USA is the place to find the information about finding information such as good workbooks (lines 8-9).

**Extract 2.23**

*Sun Hwa’s Experiences in Missy USA*

1. [Sun Hwa] In Korea, we have a lot of private education centers and so-called *cram school streets* [학원가] in our neighborhoods. Of course, there could be a great tutor here. But, since I am a Korean [immigrant], I do not have information or access to them. In addition, my expectation for tutors could be this much higher [hand gesture-high], but, I do not expect to find highly qualified tutors here. In addition, if I want to
hire a top private tutor who only works for rich people with high costs, I cannot afford to pay and hire them. And, I do not know them [although they might exist]. But, as you know, Korean tutors cannot immigrate to come to the U.S. here... So, I bought a workbook, and I searched for information about which workbook will be good for my child, including Missy USA.

Extract 2.24 shows that seeking information from the website also has limitations compared to receiving that information directly from people. Ashley expressed herself as addicted to using Missy USA (line 1). One of the biggest reasons for accessing Missy USA is the desire to receive information about her child’s academic progress from experienced other parents who are Korean immigrant parents who might have been through similar experiences. However, parents perceived the limitation of the information available on the website, which is not connected to the mainstream society (lines 5-7).

Extract 2.24

Ashley’s Experiences in Missy USA

1 [Ashley] I am almost addicted to using and searching Missy USA.

2 [Interviewer] Then, you must be knowledgeable in information about education?

3 [Ashley] No. Rather, it shows that I have limited information about education. My only information resources are there. Although I searched for information from Missy USA, the information from the discussion board has limitations. I want to receive other mothers’ information. Being a first-generation immigrant, receiving quality information about education is a bit challenging.

Extract 2.25 shows the newest immigrant family’s struggles in understanding the U.S. curriculum. Staying about 4 years, Seong Chan’s wife, Hyeon Ji additionally explained the lack
of information and disconnection between home mathematics and school mathematics (lines 1-5). And, they also do not know about U.S. mathematics terms (line 5). Subsequently, they went to a bookstore, bought workbooks, and follow up on the workbook which is not directly matched with the school curriculum (lines 5-7). Hyeon Ji’s narratives showed the discrepancy between curriculum and language in the U.S. mathematics curriculum, and their effort is from a personal level approach not seeking outside help.

Extract 2.25

Seong Chan’s Family Experiences of living in the USA

1  [Hyeon Ji] We do not know much about the U.S., for example, we also do not know
2   about the current school curriculum. And, also we do not know about the district
3   curriculum since we moved from other school districts to here. So, we do not know
4   about the U.S. math curriculum which is sometimes different from the Korean
5   curriculum, and we do not know U.S. math terms. So, we just bought workbooks at a
6   bookstore, and my husband and my child worked on the workbook which is not
7   directly related to the school curriculum.

The Reasoning for Providing Math Support

The third chapter discusses the second research question, Why do Korean immigrant parents of elementary-aged students support their children’s mathematical meaning-making at home during the COVID-19 pandemic? This section provides the reasoning for their direct mathematical support at home. Korean immigrant parents shared their reasoning for supporting mathematics at home. By sharing their reasonings, participating parents also revealed their belonging, and political and ethical values (Yuval-Davis, 2011) naturally in their narratives.
Five participating parents provided common reasons for providing direct home math support: Desire to belong to their children in the U.S. in terms of the glass ceiling (Jennifer, Sun Hwa, and Ashley), filling gaps in low-quality public education (Judy, Sun Hwa, and Ashley), financial or physical reasons (Jennifer, Seong Chan, and Sun Hwa), and building studying routine (Jennifer and Sun Hwa). And, these narratives also designated their parenting styles including the image of tiger parenting.

The first reason for providing direct home math support is that Korean immigrant parents desire their children to belong in U.S. society guides them to put effort into their children’s education. Participants wished their children can overcome racial stereotypes such as model minority stereotypes, perpetual foreigner stereotypes, and glass ceilings toward the minority population. By pondering about glass ceilings, Jennifer, Sun Hwa, and Ashley desired their children to be good at mathematics and provided support and they saw mathematical support as one of the possible ways to get close to glass ceilings for Asian populations although glass ceilings will last forever. By supporting their children, Korean immigrant parents wish for their children to overcome perpetual foreigner stereotypes.

The second reason for providing direct mathematics support is to fill gaps in the low quality of public education. Sun Hwa shared that her expectation of the quality of public schooling was not satisfactory, so she additionally put effort. Judy and Asley also were not fully satisfied with the public schooling. Their narratives show their expectation of U.S. education is sometimes not satisfactory which may hinder to have enough belonging (Yuval-Davis, 2007) in the U.S. school system.

The third reason is because of financial or physical Reasons. Seong Chan provides mathematics for his child because he can explain it, but he thought that hiring a tutor will be
better, but he explained financial reasons. And, Jennifer also mentioned the financial reason for hiring a tutor. Sun Hwa shared that the distance to cram schools is one reason for providing direct support.

Last but not least, Korean immigrant parents shared that the home support will be beneficial for their children’s daily studying routine. Especially for elementary-aged children, participating Korean immigrant parents perceived the age group as a crucial period for their children to build up studying skills to be continued in the later grades without further parental involvement. Jennifer and Sun Hwa highlighted that building a studying routine is important although the studying time is about 10-20 minutes per day. And, the narratives about their building routine also connected those participating parents discussing the image of Asian parents as “tiger parents”, but their opinion on their parenting style varied.

Their voices demystify the model minority stereotypes and counter the argument that mathematics education serves as an absolutely inclusive subject. In addition, Korean immigrant parents shared how they are supporting their children during the COVID-19 pandemic with both positive and negative experiences in their narratives.

**Desire to Belong and Survive: STEM, Perpetual Foreigner, & Glass Ceiling**

Korean immigrant parents perceived that STEM subjects are more welcoming to their children, as opposed to fields with an emphasis on language skills. Korean immigrant parents are more comfortable with supporting their children’s mathematics compared to supporting other subjects like Language Arts. And, at the same time, they admit that parental involvement plays a crucial role in their children’s mathematical meaning-making. And Korean families use workbooks and textbooks to build up mathematical meaning at home during the COVID-19 pandemic. While putting their effort into children’s academic progress, Korean immigrants hope
that their children can live independently in the U.S. after finishing schooling. Jennifer, Sun Hwa, and Ashley commonly mentioned that Asians face a glass ceiling and that they pursue careers in STEM areas. And, they wish their children also can survive with income in those areas to independently live in the future without parental support in the US.

Extract 3.1 shows that participating parents perceive the existence of glass ceilings which is someplace is more challenging to access for the immigrant population. Jennifer admitted the existence of glass ceilings and she perceived STEM areas have comparably little discrimination (line 3). Correspondingly, she put their effort into math that can have opportunities for their children because parents see their accessible areas as STEM-related careers. And also, she mentioned income is another reward (lines 3-4). And, that is the reason for Asian populations pursuing those areas that have a higher glass ceiling so that they still can have jobs in the U.S (lines 9-10). This suggests that it could be possible whether Asians are inherently good at those areas or not, their perception of accessible career paths for them might influence children’s long-term life careers.

**Extract 3.1**

*Jennifer Desires their children to survive and belong*

1. [Jennifer] Anyway, I think we [Asians] have to admit the existence of glass ceilings and what's in society. But maybe because of this problem, Asian people often find
2. STEM careers such as IT with little discrimination. The income is also comparably good. That's what I'm saying. I invested the same amount of time and studied, but if I
3. can't go over there because of the glass ceiling in that area, the person should keep
4. looking for the possible area that doesn't have those ceilings or a little bit of that.
5. Because I want to make this much money and go up this much, and I invested a certain
amount of effort, but if there's a glass ceiling over there, I won't go. Of course, the glass ceiling will be very low somewhere, and it will be very high in some places. Then, people try to find areas where they can go up to a certain extent on high places. So I think this is the reason why Asian people try to keep going that way [in STEM area].

Extract 3.2 shows Jennifer shared her educational goal that a child should be independent of parents (lines 17-19). Based on her goal, she convinced her children to set a goal for themselves to prepare for the future so that they can survive by themselves while pursuing a career. She said that this society requires degrees or licenses that can give income for eating and living (lines 4-7). When her children take this issue seriously to prepare for their independent life after graduation from high school, she suggests her available support so that she can pay the interest of the tuition loan (line 14).

Extract 3.2

Jennifer’s Educational Goals for Children’s Independence

[Jennifer] When my child did not like to study, I said, “What do you want to do if you want to make your life happy? And, you are a member of society, and what society wants is to hire people who have a degree of licenses with some degree of professional study. You will be treated as much as you put in your effort. That's how much society gives you as income. When you become independent, you have to become economically, and mentally independent from your parents. So, when you become independent, how could you solve the problem of eating and living? Of course, there's a lot you want to do, but you can only do what you want after the living costs
are resolved. Mother and father now provide a home and a lot of things, but after graduation from high school, you have to become independent on your own. So, what do you want to do? The way to achieve this is to make a plan.” Then the child will think about it. "What should I do?" Then, mother and father suggest, “Although we cannot afford to pay all your tuition, if you go to college, we can support you to some extent, for example, we can pay some interest on the tuition loan. Or, while living here, I will let you live at home. There must be something like this.” Then he'll think. “Oh, anyway, if I don’t go to university or if I don't have any professional skills, I'll have a lot of difficulties eating and living. I'll think about what I should do.” In that way, the goal of my parenting and support is to make my children mentally and economically independent to live in this society. When I tell this to my children, they'll think about how to build up skills to become independent from their parents seriously.

… Immigrant families do not have strong social capital in the U.S. like having strong roots or strong backgrounds in this country. I wish my child can have strong roots in this country from now on by having strong educational background. They need nutrition, and one of the possible factors for them will be economic enrichment. So, immigrant parents desire their children to pursue a STEM career and have an independent life with enough income. By having a good career with a strong education, immigrant children and the next generation will overcome their marginalized status in the long-term period.

Extract 3.3 shows that although Asian students are viewed as a model minority and good at mathematics (Shah, 2019), participating parents put effort into mathematics education by
wishing their children can survive with skills. Although Asian parents are viewed as tiger parents, they do not always as a homogeneous parenting style (S. Yao, 2020). S. Yao (2020) mentions that his parents’ ways of involvement were not as strict as Amy Chua’s (2011) parenting style is different. As Suizzo et al. (2014) assert, perspectives in education and racial marginality lead to their types of parental involvement. Also, previously Korean immigrant parents’ reasoning for putting effort, difficulties, or tension with their children was not vividly listened to in U.S. society. The narrative in the current study shows participating parents’ wish for their children to survive in this society. These narratives suggest that educators might need to value when they see Asian children who are good at mathematics, from now on, they might look at them differently and cherish their effort including children’s parental involvement.

Sun Hwa shared her opinion on why she desires her child to be good at mathematics (lines 12-14). She saw her parents’ generation as first-generation immigrants who might choose STEM careers because of language fluency (lines 1-7). Sun Hwa brought examples that first-generation immigrants are not prevalent in language-related careers such as a scenario writer (line 3) or a politician (line 6). And, compared to literacy skills, mathematics-related careers are accessible for immigrants and allow them to eat and survive (line 13). And, also, she highlighted the Korean phrase, “To eat, to survive, we need skills.” (line 13). This is in Korean, “먹고, 살려면, 기술이 있어야죠” is a common phrase to discuss career paths. And, she wished her child could survive by having those skills in the U.S. This suggests that

Extract 3.3

*Sun Hwa’s Desire to Belong*
[Sun Hwa] I think [1G] Asians don't become so fluent in language although they live in the United States, so they pursue a career in the STEM field. For example, it will be challenging for them if they are going to write a script Scenario. People like immigrants 1.5 (generation) will be fine in terms of language skills. But, if they are the first-generation people or people who came here to study and stay here they probably don't want to become politicians. There's a limitation for immigrants to pursue language-related careers. I think that the first generations pursue [STEM area], and they think STEM areas are advantageous careers, so they hope their children will be good at math, and if they are good at math, it'll be advantageous to go to STEM areas, so I think there will be a lot of hope.

[Interviewer] Do you want your child to be good at math?

[Sun Hwa] Yes, of course. More earnestly than anyone else. [Korean phrase] We say, “To eat, to survive, we need skills.” When I studied humanities and social sciences, they were fun. But, to live because there's a limit [to pursue them].

Extract 3.4 suggests that participating parents are aware of the career paths and glass ceilings, and they are concerned with their children’s education. Similar to Jennifer’s opinion, Ashley also perceived glass ceilings exist everywhere (line 1). She sees immigrant populations face the glass ceilings such as the administrative level of human resources (lines 2-3). And, she pointed out that immigrants’ lived culture would be different from the U.S. system including communication skills. So, Ashley thinks this might be a systematic difficulty for immigrant populations to access those positions (lines 3-5). And, she worried that those glass ceilings may exist everywhere in the U.S., and it is unavoidable as having immigrant family backgrounds. However, Ashley also shared her hope in the next narratives as shown in Extract 3.5.
Extract 3.4

Ashley’s Desire to Belong

1. [Ashley] But there is no place without a glass ceiling in the U.S. Because even if you
2. become a professor, there could be administration jobs such as Dean or other
3. positions. To do that, the positions require administrative leadership. And, in that case,
4. the European American takes those major roles, and it becomes systemic. Because
5. they have lived so far, but it seems to show that abilities [communication]. There is no
6. place where you don't have glass ceilings wherever you go.

Perpetual Foreigner Stereotypes. Perpetual foreigner stereotypes (Huynh et al., 2011)
is that some minority populations are perceived as foreigners when their appearances are
different from European Americans (Huynh et al., 2011). According to Huynh et al., (2011),
Asian Americans are one of the most salient groups; they are viewed as perpetual foreigners.
Furthermore, during the pandemic, Asian hate crimes increased seventy-seven percent more than
the previous year (FBI, 2020). Compared to their experiences as first-generation, Korean
immigrant parents are more worried about the belonging of their children in the future.

Extract 3.5 shows that Ashley brought her concerns about perpetual foreigner stereotypes
(Huynh et al., 2011) that are perceived as a foreigner due to their appearance even if they are the
next generation (lines 10-11). Ashley pointed out that 2nd generation children will be
uncomfortable when they are asked about their national origin since her child was born in the
U.S. Furthermore, Ashley is more worried about the systematically educated identities of being
outsiders and developing passiveness in schooling, “Asian children don’t have such an attitude to
show off their confidence [that is different from European American children] (lines 14-15).”
Ashley confessed that she could admit White privileges being seen as a foreigner as a first-
generation immigrant with the language barrier (lines 11-13). However, she is more concerned about the 2nd generation because of the perpetual foreigner stereotypes, and systematically developing passive attitudes during schooling (lines 17-20). This narrative suggests that Asian second-generation also will face stereotypes due to appearance, which makes them feel perpetual foreigner stereotypes. And, children also develop passiveness from the school system.

*Extract 3.5*

1. [Interviewer] Do you think the second generation will face glass ceilings?
2. [Ashley] I think they will be difficult just because they're not European Americans. For example, Russian immigrant children can't speak English well either. They are also different from the major population. However, they are assimilated well [compared to our children] just because they are White. No one discriminates against them. But that's not the case with my children. Just by looking at appearance, there are a lot of things like that. People ask, "Where are you from?" My husband and I say, “We are from B city in the U.S. Then, people keep asking “Where do you originally come from? Where are you coming from? "Where did you come from?" People keep asking this also for my child… So, I feel bad for the second-generation children. I'm first-generation and my roots are in Korea. So, I acknowledge White privileges and my language barrier, and I admit my English is not perfect. [just accepting the minority and outsider] However, Asian children don’t have such an attitude to show off their confidence [which is different from European American children].
3. [Interviewer] I'm sorry to hear that.
It's very unfortunate. But when we [Korean] teachers talk to each other, they commonly say that [low confidence] was not from the beginning of the schooling. That's even more unfortunate. Asian students are educated to be passive and compliant.

Interviewer: I see!

Ashley: It's really sad. I don't know what to do. Always... That gives me a headache.

Extract 3.6 shows participating parents’ struggles and hope as an immigrant parent who perceives stereotypes but at the same time, they wish their children will break through the glass ceilings. Ashley admitted the existence of a glass ceiling in the previous excerpts. However, because of the glass ceiling, she expected and educated her child would become a person who breaks those layers (lines 1-2). Ashley mentioned that people in society have stereotypes, and those stereotypes discount Korean immigrant parental efforts. She said that parents are sacrificing their time, effort, and money for their children’s education and belonging by breaking through glass ceilings.

Ashley further addressed how those stereotypes toward Asians are harmful. “I feel that sometimes ‘Asians are good at math’. Those kinds of stereotypes make our parental support and children’s effort countless” (lines 11-12). Ashley mentioned that by putting in a lot of effort to become good at mathematics there would be remaining hope that might allow immigrant children to belong in mainstream society (lines 14-15). Ashley perceived that putting effort into mathematics would be hope.

*Extract 3.6*

*Ashley’s Struggles and Hope*
[Ashley] I wish my child will become a person who can break through at least the first and second layers of the glass ceiling in society. Because there could be multiple layers in the glass ceiling.

[Interviewer] You wish your child would break those layers...

[Ashley] So, owing to her, I wish the equity will be elevated in this society.

…

[Ashley] Korean immigrant parents support their children’s education. Although I also want to have a bigger TV, I also wish to go to the hair shop, and I also want to have good things. But, I have sacrificed all those wishes, and we put priority on the use of money, time, and effort on my next generation’s education for a better life in this country. I feel that sometimes ‘Asians are good at math’. Those kinds of stereotypes make our parental support and children’s effort countless.

…

I wish that our second generation would put effort and become really good at math, so I hope they can become at least part of the mainstream of society.

_Filling Gaps in Low Quality of Public Education_

The next common reason for providing mathematical support at home was the perceived low quality of public education. Judy, Sun Hwa, and Ashley commonly pointed out the quality of public education. Although they live in all different areas of the U.S. They felt that parental support was needed to cover missed parts from public education.

Extract 3.7 shows that Judy’s reason for providing math support was additional care for public education. She was concerned that her school district does comparably not have high-quality public schooling that other school districts (line 1). And, she thought one teacher cannot
fully take care of all different students’ academic progress (lines 3-4). And, she thinks these gaps should be filled with parental support or additional private education (lines 4-5). And, she set a goal per day and children can have free time after finishing the quotas of studying (lines 5-9).

**Extract 3.7**

*Judy’s Perspectives on Public Education*

1. [Judy] Our area has a little poor public education... But I want my child to study a little more, so I'm putting effort additionally… I think it is the teacher's ability and role to guide children who are not good at it to a certain extent to be good at it. However, how can teachers take care of all 24 students’ progress in a class? So, I think that part should be filled with private education or parental support… We have a little set amount per day to study. After reading a book and then doing math and solving all the problems, after finishing the after-school work, it's free time. My child can play iPads, play games, and play baseball outside... When my children finish all these daily quotas, then they can have free time.

Extract 3.8 shows Sun Hwa’s narrative that addresses that although they see U.S. schools providing a less competitive environment, however, their expectation of high-quality education is sometimes challenged and that interferes as a member of the school system. This is not harmonious that intervenes in a strong bond with satisfactory belonging in the last domain. Sun Hwa was not fully satisfied with the quality of public education in her school district. Sun Hwa truly believes that parental support is very important for the academic success of school children. And, she shared her opinion that this is the common thing as parents referring to her own experiences. Sun Hwa shared her concern that the quality of public education is low (line 4) in the U.S. She expressed that public education is *dead* (line 5) in her child’s school district. And,
she was seriously considering moving (lines 6-7) to other school districts when her child goes to middle school or high school.

**Extract 3.8**

*Sun Hwa’s Perspectives on Public Education*

1 [Sun Hwa] Overall, everything in Korean education is so overheated that it's a big problem because students should put a lot of effort to do well there. But anyway, the level of public education is rising to some extent. But here, the quality of public education is so low quality of public education is really low. No matter how good the school district here is, public education is *dead*. Instead, I heard that public education in the suburbs is better with good school districts. So, we're also considering moving to one of those areas when my child is in middle and high school.

Similar to Sun Hwa’s perspectives, Extract 3.9 shows Ashley’s low expectations of public schooling. Ashley was not satisfied with her child’s academic learning in public schools (line 1). The reason was that her child’s level of education was higher compared to other children in the same class (lines 15-16). And, she shared the reason is that the goal of public schooling is targeting average-level students and below-average students can become better through schooling, not focusing on advanced learners like her child (lines 8-13).

**Extract 3.9**

*Ashley’s Perspectives on Public Education*
[Ashley] I don’t have any high expectations for teachers in academic areas.

[Interviewer] Do you mean academic performances?

[Ashley] Yes. I feel that I had to lead my child’s academic excellence. I provided an accelerated curriculum for my child.

[Interviewer] Yes.

[Ashley] Because my child could not learn those at school…

[Interviewer] Do you mean that from the content of subjects?

[Ashley] Yes. Because public schools basically set a goal, like below-average level students should become average level. The below-average students are marked with red. And, the red group students should progress to yellow mark [average], then green, and blue. Usually, the public school system has goals that red-marked students should go yellow, and yellow-marked students should go green. But, it is not basically to make blue students [high level] make a darker blue. That’s just me, though.

[Interviewer] Oh, do you mean goals in students’ performance level?

[Ashley] Yes. No child left behind, that is a big motto of public schooling. But, my child belongs to blue.

Extract 3.10 shows how Ashley has provided direct math support to help her child’s advanced level of understanding based on dissatisfaction with public education. However, she also had difficulty finding information about how to support those advanced students at home by saying, “It's been hard” (line 6). Ashley tried to fill the gaps in what came in tests since she found her child could not thoroughly learn the content area at school. She also said she was thirsty for finding them (line 6). With difficulties, she keeps working on filling the gap in public education by herself for her advanced-level child (lines 6-7). Ashley explained the style of her
home support for her child’s mathematics (lines 9-16) that whenever she finds her child’s weakness that she explains and provides additional related tasks to help her understand. Ashley found her ways of providing additional explanations helped her child could have a thorough understanding of the concept in math.

**Extract 3.10**

1. [Ashley] So, the problem is that public schools don't care much about advanced learners and provide accelerated curriculum or in-depth learning. But, those advanced-level questionnaires come out on tests, or if my child participates in a mathematics competition or level tests, they are requested to solve advanced-level problems which means they need to learn them. But, at the school level, they don't do that. It's always been like that. It's been hard... I was always thirsty to receive that information. That's why I try to catch up on that part a lot at home. I'm trying.

2. …

3. [Ashley] My daughter missed some points on her grade test at school. But, by looking at her test questions I found that she did not learn all the content at school, so my daughter missed scores from content areas that she did not learn. For example, my daughter missed some points in volume. So, I printed out resources about volume. And I let my child solve the previously missed questions first, and then explain the mistakes and how to solve them, then explain the concept thoroughly. So, she missed two questions about volumes in her quiz but when she retook them she correctly solved that area since second attempts are allowed. That's how I support my child.
Financial or Physical Reasons

Although the image of materialistic Asian immigrants (S. Yao, 2020), participating parents mentioned that financial or physical reasons became a reason to teach academic skills directly to their child at home. Jennifer, Sun Hwa, and Seong Chan mentioned that hiring a tutor is physically challenging: Financial reasons (Jennifer, Seong Chan) or distance (Sun Hwa).

Extract 3.11 shows Jennifer’s financial reason for providing direct support. Jennifer believed that hiring a tutor is an effective way but there could be financial challenges. And, she can understand the concepts so that she can teach mathematics at home. But, if some other parents can't teach, she suggested that tutoring will be ideal for those parents.

Extract 3.11

Jennifer’s Financial Reason for Providing a Direct Support

1 [Jennifer] If you want help for your child with math education, hiring a tutor is the best. However, tutoring costs money. People with a lot of money can do that [not me].
2 And the tutor... If parents say they can't teach, it's best to hire a tutor. Tutors teach children well because they teach based on children’s level of understanding and guide them based on that if building a tower of mathematical understanding.
3
4
5

Extract 3.12 shows that Seong Chan also confessed financial reasons that guided him to teach his child although a father believes her way of teaching is not professional. And, Seong Chan was aware of the emotional tension between parental expectation and children’s struggling moments in mathematical understanding (lines 4-5). So, he admitted that tutoring will be an ideal form (lines 8-9) instead of direct teaching. But, the biggest challenge is financial support for hiring a tutor (line 9). This suggests that parents admit that tutoring will be beneficial but
financial difficulties lead parents to put the effort into supporting their children’s mathematical meaning-making.

**Extract 3.12**

*Seong Chan’s Financial Reason for Providing a Direct Support*

1. [Seong Chan] I have experienced those emotional responses that came out while studying with my child. For example, when their children don't understand, parents can become emotional. I believe that parents shouldn’t be emotional, but it is sometimes very challenging in practice. It's always been my question, "Why don't you understand this?" Oh, "Why don't you understand these easy things?" But, I admit that my curriculum and my child’s current learning will be different due to generational differences, but my personality is not perfect [and sometimes I become emotional].

2. So, I think it's much better to study through professional teachers or tutoring because I'm not a perfect person. [However] Money is the problem.

Extract 3.13 shows that physical reasons are one of the reasons to provide at-home support. By referring to prevalent Korean cram schools, Sun Hwa shared that her reason for providing direct support is the physical distance to access those cram schools. In Korea cram schools are located in nearby neighborhoods. But, in the U.S. due to the size of the country and population, it is not similar to Korean cram schools. So, Sun Hwa is providing direct support.

**Extract 3.13**

*Sun Hwa’s Physical Reason for Providing Direct Support*

1. [Sun Hwa] Where I live here, there is no close cram school. I cannot drive every day more than 30-40 minutes to commute to those cram schools, and due to the distance
and not available places. But, I believe that I should support my child’s studying, so I just bought workbooks and found internet resources because I cannot teach without any resources.

**Building a Studying Routine**

Last but not least reason for providing support was trying to build a long-term studying routine for their children. This is a totally different image of endlessly forcing their children to study hard. Although model minority stereotypes and Asian students would be naturally good at mathematics, participating parents put effort at home although those are not visible from the outside. participating parents establish their children’s studying routine as ten to thirty minutes for the future.

Extract 3.14 shows that Jennifer is building a studying habit including mathematics. Jennifer believes the studying habit is a foundation for the later schooling of her children. And, her involvement style for a child’s studying shifts from direct instruction to self-motivated independent studying. Having four children, Jennifer asserted she did not extend her direct mathematical support to her children after their elementary grades (line 1). Jennifer shared her opinion that the period for providing mathematics support was mostly limited to elementary-age (lines 4-5). Jennifer’s justification was that the elementary period is the critical time to build up a daily routine for the later school years (line 5). Since she believed the well-built habit guides the child to study by himself independently in secondary schooling (lines 5-6). She just bought workbooks for summer, and her children solve them by themselves (lines 7-13).

**Extract 3.14**

Jennifer’s Efforts for Building a Studying Routine
[Jennifer] I only support mathematics till elementary age, no more than later.

[Interviewer] Do you mean that your children study by themselves when they become middle school students?

[Jennifer] Yes. I believe elementary school age is the most important period to build up a day-by-day study routine for my child. Then, they learn how to study, then I do not need to directly support schoolwork during middle school and high school. But, when they face a challenging task and ask for it, I can explain it to them. That’s it. I only buy the workbook during summer for my middle school-aged children. If he finished 7th grade, then I buy an 8th-grade workbook which is a little easier than [hand gesture: put both hands together, then one hand goes down] the current level of the curriculum at school, so he can review the current curriculum and also learn 8th-grade level, too. Thus, the bought workbook is not too challenging for him. And, just say one page a day during summer. Then, I do not worry about his schoolwork. When the semester begins again, then he can study, and do his work by himself.

In Extract 3.15, similar to Jennifer, Sun Hwa also highlighted the importance of building a studying routine for her child. And, she delivered her message that although it is not the favorite part (line 3), overcoming and finishing it is important to accomplish anything in life. This is her value and identities sharing for putting effort and building on that every day. Sun Hwa believes that patience in studying is one of the most important parts to accomplish things (lines 5-6) that are more important than learning mathematics (lines 1-3). Sun Hwa valued continuing studying and trying to guide their children to build up a studying routine for overcoming challenges (lines 3-4). Taken together, participating parents in this study try to build a studying routine for their children to become lifelong learners.
Extract 3.15

1 [Sun Hwa] For my child, I address not only solving this workbook but also trying to teach her that sometimes we should keep maintaining a routine that is useful although it is not our favorite thing. I try to encourage her, at least, to keep a routine or habit to study is a valuable thing. Since this applies to every life. If I don’t want something to do, then if I postpone it again and again, a person cannot accomplish anything. So, I just told her to study for 10 minutes, not requesting several hours. So, I say we can do this.

Supporting and (Not) a Tiger Parent

Listening to participating parents’ narratives about the reasoning for providing support suggests that the image of tiger parents is somewhat misleading, the common misconception is that always scolding and forcefully pushing children to study all the time. The image of tiger parenting as an obsessive image was somewhat different in the section on building a studying Routine.

Even though the prevalent myths about Asian parents in the U.S., S. Yao (2020) points out that there are different parenting styles among parents. Like S. Yao’s suggestion, three participating parents in this study, Jennifer, Sun Hwa, and Ashley believed that they are not a strict “tiger mother” But, two parents, Judy and Seong Chan admitted that they are tiger parents, but their degree of tiger parenting varied in their narratives. This suggests that the image of Asian American parents may be problematic to create a homogeneous category for them, and that influences their ways of being (e.g., Sun Hwa’s uncomfortable feeling when other parents assumed her like a tiger mother).
Extract 3.16 shows that Jennifer said that she is not a tiger mother now (line 1). Rather, she explained why should study for her child, which motivates her child to do it. And, she shared her previous experiences with her first child. She explained how her parenting and philosophy have been changed.

**Extract 3.16**

*Jennifer-I am not a Tiger Parent*

1. [Jennifer] I am not a tiger mother. I give freedom to my child. To be honest, if my child is not interested in studying, I can't help it. I believe he will be talented on the other side. So, I let my children know how to study on their own. I let them know why I should study. Then, it motivates them to do it in the long term.

As shown in Extract 3.17, Jennifer explained her reasoning about that, “I do not scold my child” (line 2). After the way was not successful for my first child.” And, she explained that scolding negatively affects the child’s understanding of concepts, rather they remember the mother's emotional responses (lines 4-5).

**Extract 3.17**

*Jennifer, Debriefing Session After the Observation 1*

1. [Interviewer] And, you never scold your child.
2. [Jennifer] Just I do not scold my child. If I scold them, they panic, and I feel bad, he feels bad. There is nothing to earn from scolding… If I scold my child, then children panic. So, scolding is not helpful for children’s academic progress. Children only remember their mother's upsetting emotions. This is not my perspective, my first child confessed that. I had the wrong philosophy. I thought my child's dream would come
true instead of me. I made a lot of mistakes with my first child. I did not know how to, but those forcefully pushing him did not help my child at all.

Extract 3.18 shows that Jennifer shifted her parenting style throughout times in the interview sessions. Jennifer explained Korean historical backgrounds (lines 1-4) and the mother’s responsibilities in education. Previously, she had high educational expectations for her first child and is connected to responsibilities and a desire to achieve success for herself. In lines 1-2, Jennifer shares Korean people’s common belief that a child's successful educational attainment is considered a mother’s success. This saying is similar to Western’s, “One good mother is worth a hundred school teachers” (gendered expectation). Jennifer made a connection between these mothers’ desirable responsibilities toward their children with feelings of guilt whenever children’s educational progress or health issues are facing challenges. She confessed this in her interview, “If my child is sick, I feel that it's all my fault. and if my child is not good at studying, it's all my fault as a mother.” Jennifer said her way of forcing children to study failed in her first child (line 8). Jennifer confessed her previous failure (lines 8-9) and guided her to change her way (lines 11-12). After noticing her child’s emotional struggles and low self-esteem, she apologized to him and changed her educational philosophy. And, currently, she is not a tiger mother anymore.

Extract 3.18

Jennifer, Interview 1

1 In Korea, we say, “As a mother, her child farming (analogy) is bountiful because her child went to a good school (엄마로서 자식 농사 잘 지었다).” In that sense, I had a philosophy that a mother should dedicate herself to her child. So, if my child goes to a
good school, that would be my success. But, I had a really hard time educating my first child. I had a hard time [by forcing him to study more], at the same time, he had a hard time [by receiving a lot of stress in studying], too. I did not know how much the accelerated curriculum is appropriate for my child, so I forced him a lot by setting a very difficult goal. So, I failed. I realized my child really hated my way of teaching and had a very high expectation of him. When he was in middle school, he confessed his self-esteem was very low. And, he said my mother did not like me. I was surprised to hear it from him, and I deeply apologized to him. And, I changed my expectations and philosophy, and ways of guiding my children at home.

Extract 3.19 shows how perspectives of self-image will be different among parents. Judy believed in herself as a tiger mother and helicopter mother (line 1). She gave an example that she monitored her child’s tutoring sessions for her first child (lines 1-6). However, she also mentioned that her child did not want to be seen by her mother (lines 6-7). And, she is aware of her child’s increased independence (line 8). Judy shared her opinion that she wants to support a child's favorite area. For Judy, she desires to help children become good at what they like. So, she wants to provide her children with available learning opportunities. Judy is supervising her child’s education: She teaches math directly to her children, also she hires a tutor for literacy, and she monitors the tutoring sessions.

**Extract 3.19**

**Judy-I am a Tiger Parent**

1 [Judy] I think I am a tiger mother and helicopter mother. For example, when my first child received literacy online tutoring. And, I sat next to him for about 1.5 hours
throughout the tutoring session while I was wearing earphones. I was not on camera, but when his tutor asked to find some pages, I helped him. And, his tutor asked some questions, but when my child seemed to be having difficulty, I gave him a hint to help the flow. But, my first child doesn’t like my supervision now, saying, “Mom, I can do this by myself from now on”. He is a rising 5th grader now, so maybe he is getting independent from me…I think my children’s favorite area can become good at it. I want to support what he likes. For example, my child is interested in mathematics, so I directly support his math. And, my first child learned baseball. And he said he wants to be good at baseball. So, I hired a baseball coach who was a professional baseball player.

Extract 3.20 shows that Sun Hwa shared her own experience that she was seen as a tiger mother, but her self-definition is not a tiger mother. Sun Hwa shared her uncomfortable feelings that other parents extrapolate that she will be a tiger mother who holds great educational information and supervises her child (lines 3-4). Although Sun Hwa had no specific plan for summer (line 13), people asked about specific study plans about workbooks or resources (line 11). This suggests that the image of Asian mothers influences one. The stereotypes made embarrassing moments that could be inappropriate in social relationships.

Extract 3.20

Sun Hwa-I am Not a Tiger Parent

1 [Sun Hwa] Some people think of me like that [tiger mother].
2 [Interviewer] Really? Does another mother think like that?
[Sun Hwa] Yes. There is an image that Asian mothers will be tiger mothers, and especially they may see me like that since I have a higher education degree. If other parents and I get close to each other, we know each other’s educational backgrounds or we can see those on Facebook. And, many people keep asking me about my child’s learning. Sometimes, people who were not close, not very close, asked about my child’s study plan. Although we only met once at the entire parent's meeting, we were just on the same group chat. I'm not very close to that mother, so my first impression was "Why are you asking me this?" Their questions were about "What kinds of workbooks or resources your child is going to study during the summer?" I wasn't thinking about it even. So, I thought “Why are you asking this?” so sudden [without any close relationship]. At that time, I had no plan for summer, either. So, I just thought to myself, because I have a higher education degree and am Asian, they might expect that I plan and teach so many things during the summer.

Extract 3.21 shows Sun Hwa's counter-narratives of people’s preconceptions of a tiger mother image toward her. Although other people interpreted Sun Hwa as a tiger mother, Sun Hwa did not forcefully push her child’s study (lines 3-4), did not plan and schedule ahead of time, and did not keep a rigorous routine (lines 7-8). The image of tiger parenting created a space for other parents to perceive Asian parents’ ways of supporting their children. And, these create less belonging for Korean immigrant parents, in terms of identification and emotional attachment.

**Extract 3.21**
[Sun Hwa] I've never thought about myself as a tiger mother. Although I am supporting my child's math, it's because I have time, and I can teach that I can understand my child's math. But, if it gets harder [in advanced level], I don't think I am forcefully pushing her back to study. So, we often postponed today's study for tomorrow.

[Interviewer] If your child doesn't like to study for some days?

[Sun Hwa] Although I wanted to keep it for her, sometimes she is tired. I am so tired, too. Then we just don't do it [skipping studying at home].

Extract 3.22 shows that Seong Chan admitted him as a tiger parent in terms of practicing discipline. But, his justification is preparing for his child’s independence and living alone in a society that differs from the scolding and fierce image of tiger parents (S. Kim et al., 2013). Since Min Hwan is an only child, he wants his son to become an independent and responsible person. Even if Seong Chan defined himself as a tiger father, the meaning is not about academics but discipline which is different from tiger parents. As S. Kim et al. (2013) explained, tiger parents are viewed as parents who discipline their children with the importance of family obligation and academic achievement with less warmth and less democratic environments. And, Seong Chan’s story of preparing for his child’s future independence is similar to Jennifer’s educational goal for her child to become an independent individual. This suggests that the degree of tiger parents is not firmly defined, and the degree of strictness is a subjective, not objective term. Based on observation sessions, collective narratives between parents and children had a strong rapport. In the debriefing session, Seong Chan said the value of routine but not too excessive amount of time, “We set a time goal of 30 minutes as maximum. Because I think if we study too much my child might lose interest in mathematics is an adverse effect. This also shows
that there is no sufficient connection to claim Seong Chan as a tiger parent who forcefully guides children’s academic progress. And, this shows the perception of self-defining themselves as tiger parents are subjective and not objective.

**Extract 3.22**

*Seong Chan-I am a tiger parent since I value building on routine.*

1. [Seong Chan] I feel that I am a tiger father.
2. [Interviewer] What kind of strict way do you have?
3. [Seong Chan] I try to keep routine and self-discipline for him by taking care of his schedule tightly. I say, “Please do this, then do this.” Because I believe a person should be responsible to do things by having a strong timeline, I usually talk about the importance of keeping a routine, like time to sleep, and setting a time goal. And, I also say do it by yourself. He is now a rising fifth-grader. But within 10 years, he will become separate and independently live from us. So, I explain that my child should live alone, so I say, “You should prepare these things, you should live by yourself.”

Extract 3.23 shows that a parent perceives herself as a half-tiger mother who is not having strictness. Although the image of a tiger mother is cold and strictly supervises her child without democracy at home, Ashley’s description shows that studying is not bound to a strict routine (lines 1-4). It was based on the condition of both a parent and a child, so when they were tired, they skipped the schedule (lines 4-5).

This suggests that the homogeneous image of tiger parents might be problematic as S. Yao (2020) suggested. Like Ashley, she self-defined herself as a half-tiger mother. But, she does not always keep her studying routine for her child. And, also she gave her child to make a decision that is different from the definition of tiger parenting lacking democracy. Ashley shared
that she provides home study by considering daily conditions and the emotional bonds between them.

**Extract 3.23**

*Ashley-I might be a half-tiger mother*

1. [Ashley] I might be a half tiger mother or a half helicopter mother who is not strict.
2. There are a lot of times when we just watch television together. Although we had to study [to keep the routine], sometimes we turned on the television, ate together, and did not have study time for that day. Sometimes I am so tired, and I just say let’s skip it. When my child wanted to skip studying, we skipped it.

**The COVID-19 Pandemic**

I planned this study for 2020 when the COVID-19 pandemic began. And, the data collection period was June through August in 2021. Necessarily, the topic of the pandemic came across in the narratives, and participating parents shared their experiences about that in two ways including pros and cons. Commonly, although the pandemic period had challenges, parents also see the advantages and disadvantages of supporting their children’s mathematics and academic progress.

**Challenge in Pandemic.** All five parents, Jennifer, Judy, Sun Hwa, Seong Chan, and Ashley commonly mentioned that the COVID-19 pandemic added other layers of challenging situations to their children’s learning.

Extract 3.24 shows Jennifer’s difficulties with the increased physical and emotional duties during the COVID-19. Although Jennifer shared her child’s positive experiences in remote schooling previously, this was an increased responsibility for herself. She had a very hectic schedule for caring for her children: She had to cook and watch together with her
children’s remote schooling (line 2). And, she explained the reason for watching her children’s classes is to help them pay attention to the classes considered elementary-aged children and to check their understanding of the concepts (lines 4-5). Also, she cooked lunch for her four children, and she made the lunch on time based on different school schedules such as *Lunch Bunch*. Also, after school, she checked the child’s homework and explained her children’s struggling areas from that day.

**Extract 3.24**

*Jennifer’s Challenge in Pandemic*

1. [Jennifer] During the COVID-19 pandemic, I lost a lot of time [for myself]. I couldn't do anything during the day because I had to cook and watch my children’s online studies. Since it's an online class, I had to keep an eye on my elementary-aged child to concentrate, and I had to know what my child is studying and how he is understanding the contents. Since I am also a college student, although I want to study during the day I can't concentrate on my things. Because my children are in classes, I have to cook their lunch in the middle, too. Sometimes there are ‘Lunch Bunch’, which are times when my child, teachers, and friends should talk together while they are eating their lunch. So, I should prepare his lunch for his schedule, and there are various online meeting times for my children. Usually, we have meetings until 3 o'clock and 4 o'clock, then we also have to do homework after that. So, I have to check the homework and I have to cook dinner for other children, so I can't make time for my assignments at all during the day.

2. [Interviewer] So, during the COVID-19 pandemic, did you give up a lot of your time and paid attention to your children?
16  [Jennifer] Yes. I think I was under a lot of stress because of that.

Extract 3.25 also shows that Judy’s physically increased responsibilities for providing care due to the COVID-19 pandemic: time management for online schooling, serving 4 different times of lunch for her 3 children and herself. As a working mother at home, she confessed one of the challenging situations was children sometimes intervening in company meetings (lines 9-10).

**Extract 3.25**

*Judy’s Challenge in Pandemic*

Judy’s narratives revealed the difficulties as a mother during the COVID-19 pandemic.

1  [Interviewer] Compared to pre-pandemic, do you think your care duties increased?
2  [Judy] Of course. [My workloads are] Much more than before. For example,
3  previously, I just dropped my children off then I needed to pick them up after school.
4  But, now [due to the online schooling] I set an alarm on the timer because my three
5  children all have different school schedules. Thus, I use Amazon Alexa. If my child
6  should go to 10:10, I set a timer alarm for 10:09 am, then Alexa says, “Lee Sang, go
7  back to school.” Then, my children go back in front of the monitor. This is because I
8  am a working mother, during my meetings I cannot check whether my children are
9  attending school or not. Then, my children help each other if they can't hear the
10  alarm... It is sometimes challenging for me when my children jump into the middle of
11  my work meeting. Also, I should prepare my children and my lunch four different
12  times. Because, recently our school district provided an option to attend school so half
13  of the students attend onsite, and half of the remaining students are attending school
So, lunchtime has been changed, and my three children all have different lunch schedules. That is one difficult thing for me.

Extract 3.26 shows the challenges for elementary students during the COVID-19 pandemic. Because there are so many distractions in remote schooling. As a working parent, Judy mentioned that she cannot supervise her children all the time (lines 5-6). Judy thought this could be less if her child attended the school face-to-face since it could be visible and avoidable when a student builds Legos under the table, but students can do different activities beyond the camera.

Extract 3.26

[Judy] Another thing since it is remote schooling, one of my children received some warning from his homeroom teacher which was not a problem face-to-face. Compared to school attending classes, my child could not fully focus on remote schooling. For instance, once my second child was working on building *Legos* under the table [pointing gesture: under the table] and the teacher noticed he moves his hands under the table and let me know that situation for me. He might not do that if he was in the classroom. Although I wish I could observe my child, I am working, so I cannot supervise my child all the time.

Extract 3.27 shows that participating parents are concerned about achievement gaps among students. Sun Hwa was concerned about the increasing learning gaps among students during the COVID-19 pandemic. Although her child was in advanced level classrooms before the pandemic (lines 1-3), there has been no accelerated curriculum for students who took the online classes including her child during the pandemic (lines 8-9). So, Sun Hwa believed that there was less quality education compared to previous years. She mentioned that those services
for advanced learners were all stopped (line 13) during the pandemic. This suggests that parents who have children who need an advanced level of education might have been concerned about the continuous quality of education. And, she was more concerned about increasing gaps during the pandemic.

**Extract 3.27**

*Sun Hwa’s Challenge in Pandemic: Learning Loss*

1. [Sun Hwa] My child’s school district has a great score in students’ grades, and the advanced level students have received an accelerated curriculum, which is faster about 1 year or 1.5 years of the current grade.
2. [Interviewer] Is your child in advanced math classes?
3. [Sun Hwa] Yes, she is. But, the problem during the pandemic was about that. Because students are split because some students only take online classes, and some others who are taking hybrid versions attend a few days at school. Thus, in the last quarter of this year, there has been no accelerated curriculum for those who took online classes, so I feel this is less quality education for students [compared to the pre-pandemic period]...
4. Originally, [before the COVID-19 pandemic] the most advanced learners like Top 5 students were brought into other classrooms, and they received challenging work.
5. Those students were taught separately during the math classes. However, those kinds of services for the advanced learners were all stopped after the COVID-19 pandemic began.

Extract 3.28 shows that parents are worried about increasing gaps among students: students who cannot receive parental support based on parents’ working conditions might have difficulties in focusing on classes and being exposed to online games. And, students who receive
parental support also participate in online games due to the pandemic with a desire to belong and feel connected. Parents perceived the Covid-19 pandemic created a bigger gap among students because parents had more responsibilities in supervising their children’s remote schooling. And, this became another reason that they provided direct academic support during the pandemic.

Sun Hwa explained she was lucky that she was at home and could take care of her child’s remote schooling and studying (lines 1-2). However, she thought that other parents who should work on-site like front liners (line 5) could not take care of their children’s education. And, children can be distracted from classes without parental supervision (lines 5-6). And, she gave an example of easy exposure to playing games (line 8). Sun Hwa provided some examples from her child’s friends who play online games throughout the day (lines 10-11). And she pointed out that one reason for playing games is the desire to belong to peer groups allowing students to access online games (lines 13-14).

Extract 3.28

*Sun Hwa’s Challenge in Pandemic: Increasing Gap*

1 [Sun Hwa] Yes. I believe the [achievement] gap is bigger during the pandemic than
2 the pre-pandemic. We were fortunate parents who can work from home, so we could
3 take care of my child, and we could consistently provide academic support as before
4 the pandemic. But, due to the pandemic, some parents might have changed their jobs,
5 or parents who should work on-site like front liners could not take care of their
6 children at home, so their children can be easily distracted [without parental care and
7 support]. For example, children do not physically attend their classes and attend
8 online. So, some students can easily be exposed to playing games. Thus, I believe
9 those children cannot manage their academic progress and attention in the classes.
Then, their scores will naturally fall behind [compared to children who are managed and cared for by their parents] ...Some of my child’s friends play games throughout the day.

Before the pandemic began, I had never allowed my child to play online games. However, during the pandemic, children can meet their friends via online game playing. So, I had to allow my child’s game playing 3 times per week. I feel we are a bit more generous parents than other Korean parents who only allow game playing once a weekend. However, some of my child’s friends play games throughout the day...So, I feel that children’s grades will be influenced and lowered overall during the pandemic.

Extract 3.29 shows that parents also consider a long-term inclusion of Asian children after the pandemic. Sun Hwa also worried about emerging social issues of Asian Hate crimes and the future of an inclusive atmosphere in the U.S. She remembered this country was safer and better, but these days are not. So, she sometimes questions whether it is a good life decision for her child’s future. This suggests that the image of a safe and great country has somewhat faded glory in terms of Asian hate crime and hatred towards Asian Americans with the COVID-19 pandemic.

Extract 3.29

Sun Hwa’s Challenge in Pandemic: Asian Hate Crime and Children’s Inclusion

[Sun Hwa] Recently, there have been issues of Asian Hate Crime, so I am concerned about those things sometimes. So, I imagined and asked myself, “When my child grows up when she had her career, the U.S. society will be a safe and great country at
the same level as when I came to the U.S. around [the 2000s], I felt the U.S. society was safer and better." So, I think, “Is it still fine to stay in the U.S.? Or, should we go back to Korea by putting effort into her Korean language skills so that she will not forget that for her future and also she can broaden her perspectives?” I sometimes think like that.

Extract 3.30 shows Seong Chan how to perceive the disadvantage of the COVID-19 pandemic period. Similar to Sun Hwa’s concern, Seong Chan discussed distractions in remote schooling. Since children do not physically attend schools, they have more freedom that might distract them from focusing on what teachers are doing. Her child was able to go to grab the water and go to the bathrooms (line 4).

**Extract 3.30**

*Seong Chan’s Challenge in Pandemic*

1. [Seong Chan] If children can attend school, children can fully pay attention to their teachers immersively, but since children are watching their teacher through the monitor, they can easily be distracted and might daydream. They can easily drink water during remote schooling and go to the bathrooms.

Extract 3.31 shows that limited socializing opportunities during the pandemic were one of the disadvantages for the children. Ashley was concerned about the limited socializing opportunities (lines 1-2) since she and her child cannot meet other families due to the COVID-19 pandemic. Her additional concern was that her child spent more time alone (line 8) at home because as a working mother, it was hard to help her child’s socializing and build a strong bonding with her child in terms of providing enough emotional support (lines 3-5). Ashley believes she should be not only a mother but also a friend and a teacher role for her child.
Extract 3.31

1 [Ashley] Due to the COVID-19 pandemic, it is more challenging to socialize and hang
2 around with other families…
3 I am a working mother, so sometimes I am tired. I feel that I do not fully provide
4 emotional support for her. I am asking it by myself. “Do I have enough quality time
5 for her?”
6 [Interviewer] Could you share more about what kinds of emotional support you want
7 to give to your child?
8 [Ashley] During the COVID-19 pandemic, my child spent a lot of time alone because
9 she is an only child and does not have siblings. So, I felt I should be a mother, a friend,
10 and a teacher for her. I wish to have a strong bonding with her before her puberty. But
11 I could not have that [quality] time for her. So, it’s a shame that I couldn't have that.

Advantages during the COVID-19 Pandemic. Even if there have been challenges for
participating families, they also shared how they perceived the pandemic as a beneficial period.
Extract 3.32 shows that Jennifer appreciated the remote school for her child, made academic
progress, and develop confidence during the pandemic. She watched the online classes together
with her child (lines 2-3). By observing her children’s schooling right next to him, she could
figure out her child’s progress day by day. She said that she was able to avoid his distractions.
Accordingly, her way of supporting is noticing her child’s struggling area in mathematics and
providing the related tasks or problems (line 6) about that to have enough understanding and
practice (lines 7-9). She believed that developing understanding and practices that guided the
child became more confident and active (lines 12-13) in mathematics classes.

Extract 3.32
Jennifer’s Advantage during the COVID-19 Pandemic

1. [Jennifer] It was convenient and easy to help my child study at home during the COVID-19 pandemic [compared to the pre-pandemic] because I can watch all the online classes next to my child. I can check what he is working on next to him. Then, I can easily notice my child’s academic strengths and difficulties such as he couldn’t understand the concept. I’m helping those difficulties with him at home. Daily, I let him solve more problems related to the difficult areas, and that’s the way I help him. Then, my child becomes a little more confident than before. And, I think math requires enough practice beyond understanding the concepts, so children should practice the concepts enough, then the child can solve problems quickly, too. And the child can catch up on the concept quickly of that problem. Thus, after having an understanding of the concepts, enough practice is needed. So, my child continued practicing a little ahead of the curriculum, and my child became more confident, more interested, and more active in class.

As shown in Extract 3.33, for Seong Chan’s family, the pros of the COVID-19 pandemic were that it was easy to ask for help from his mother, and Min Hwan learned how to manage time schedules by themselves. Another benefit of the COVID-19 was the transparency to share each other's assignments. The mother mentioned her child made progress by referring to his classmates' assignments.

Extract 3.33

Seong Chan’s family--Advantages of having access for parents & transparent evaluation.
[Hyeon Ji (Mother)] I think during the classes [at school] my child will not ask about things. But, [during the pandemic] I stay at home, and he asks when he cannot understand concepts. Since I can respond to his questions, we can check the part together. That is the advantage of remote schooling...Another advantage is my child can manage his schedule by himself. At school, teachers remind the next schedule for the students, such as “This lesson has ended, so you can move to the next classroom.” But, now at home, my child should self-check those schedules, and help with self-discipline.

... Another benefit is for checking the assignment. [before the pandemic] It was fine just submitting their assignment to their teachers. But, now [due to the online schooling] children can see all other peer’s assignments together. So, it was a good chance to learn from others. For example, my child checked other students’ work and figured out, "My friends worked on it like this, I want to revise and submit the better version. I wrote my assignment too short. Mom, I will write longer than other students, I will revise this way." Since children share their assignments, this is a good stimulus for each other, and it helps to find their weaknesses to revise and put more effort.

Extract 3.34 shows that Ashley interpreted the COVID-19 pandemic provided her opportunities to see their children’s progress and ways of evaluation. And, that was positive for herself.

*Extract 3.34*

Ashley’s family--Advantages of having more time to support, and transparent evaluation.
[Ashley] During the COVID-19 pandemic, the school attending time was shorter than normal. So, I could help the child’s learning progress more. I think the COVID-19 period allowed me. Secondly, compared to the previous, how can I say this? All the evaluation was done at school, so I could not see which part was evaluated visibly. So, previously, if my child received a score of B, I only guessed how she was evaluated. But, [during the pandemic] on the online platform, the evaluation procedure was very transparent to see. Because the [online] platform provided each assignment with this score and had an explanation why this portion was graded lower. I could check them every day. So, I noticed that and shared it with my daughter, saying “I missed this part. Later we can do this part better at schoolwork. That guidance can be checked on online platforms. That helped me [how to support my child].

Discussion

The major findings of this study are answering the two research questions about how and why Korean immigrant parents support their elementary-aged children’s mathematical meaning-making at home during the COVID-19 pandemic. And, I will address the meaning of those findings.

The Ways of Supporting Mathematics at Home

This section discusses the first research question: How do Korean immigrant parents support their elementary-aged children’s mathematical meaning-making at home during the COVID-19 pandemic? This research question was explored in two chapters: Mathematical code-switching and Cultural negotiation. I report how and why Korean immigrant parents support their children’s mathematical meaning-making using code-switching and cultural negotiation that addresses conceptual differences across language and culture.
Mathematical Code-Switching

Language is related to code-switching between English and Korean. Most Korean immigrant parents used Korean as the main language to explain mathematics. However, they tried to use English to deliver a clear meaning of mathematics. In this study, I named them Mathematical Code-Switching. And, there were five mathematical code-switching patterns for mathematical meaning-making during the interaction. First, repair code-switching is repeating the same meaning with another language to clarify mathematical meaning. Second, justifying code-switching is that language is shifted when parents try to request ways of problem-solving in mathematics. Third, sequencing code-switching is when language is changed to prompt the next step of the mathematical task to help procedural understanding of meaning. Fourth, US math term-related code-switching is when language is shifted to express precise US math terms of math expressions to deliver mathematical meaning. Fifth, mathematical competence-related code-switching is when language is changed to jump in to give explanations by monitoring a child’s understanding. Code-switching is a form of effort that Korean immigrant parents tried to deliver mathematical meaning to their 1.5 or 2nd generation children.

One thing that I realized from observation was, that although participating parents perceived the Korean language as not directly related to their children’s academic performance, their interaction with the two languages was successful and beneficial for their mathematical meaning-making. However, at the same time, this shows they still need support to see the differences and similarities in curriculum, language, and culture to negotiate and explain.

Cultural Negotiation

By observing Korean immigrant parents, this study suggested cultural negotiation as the interaction with mathematical meaning, concepts, and mathematics identities being jointly
explored in terms of different cultures and languages. Not directly connected to code-switching, Korean immigrant parents also worked through cultural negotiation and sometimes tried to provide cultural revision for their children’s understanding referring to their learned curriculum, mathematics identities, or lived experiences.

Participating parents explored generational and cultural gaps during mathematical meaning-making interactions. And, they provided cultural revision for helping children’s mathematical meaning-making, and also provided explanations about differences in their language, culture, mathematics identities, and curriculum during the interaction. For unfamiliar cultural terms in a word problem, parents improvised them to a familiar form to explain the mathematical meaning. And, when a child made an error referring to a Korean expression, parents explained that with the U.S. way.

And, the meaning-making process between parents and children naturally included mathematics identities, emotional tension, praise, the value of on-time efficiency, the importance of double-checking, and the importance of learning mathematics. Since mathematical learning requires taking risks with various tasks, the parents and their children experienced emotional tension. For example, a child is too tired or daydreams about other things; a child made mistakes that he just learned, or a child is not comfortable having their mistakes pointed out. Although those learners receive good grades at school, they still showed that mathematical meaning requires practice to build a strong foundation that differs from images of Asians being innately good at mathematics. And, by overcoming tensional moments, parents also praised, gave rewards, explained again, and suggested other ways to accomplish that goal of becoming capable learners.
Parents’ mathematics identities and the value of mathematics learning were discussed naturally. Korean immigrant parents highlighted time efficiency, and double-checking, and they shared their belief on the importance of learning mathematics as building foundational knowledge that can be applied to other subjects or other areas at an advanced level (e.g., STEM subjects). And Korean families used workbooks and textbooks to build up mathematical meaning at home during the COVID-19 pandemic. Also, participating parents shared their experiences about model minority stereotypes, but they also wished their support will help their children will be capable learners.

However, because of immigration, Korean immigrant parents seek information online. The largest Korean online community in the U.S., Missy USA is one of the locations where they receive support from other Korean immigrant people. Although they do not receive direct support from local communities, that is one way to feel a sense of belonging and also earn information about children’s education. Taken together, Korean immigrant parents and their children’s narratives show that they still need support in language and cultural differences in their mathematics schoolwork.

There have been myths: Asian students are inherently good at mathematics, Asian parents are tiger parents, they only pursue their children to receive A grades. They are likely on the highway with an easy path, and they don’t have difficulties. However, my study shows their experiences are closer to a winding road: Lack of information about their children’s education, perpetual foreigner stereotypes, language barriers, cultural differences, model minority stereotypes, tiger parents myths, less belonging, and not many Asian (Korean) American teachers. Those are challenging. To overcome these challenges, Korean immigrant parents are working on supporting children’s mathematical meaning-making by doing code-switching,
cultural negotiations, and shared identities. Through this, participants are working on their children’s belonging in society. They are not tiger parents, rather they are caring (Noddings, 1984, 2005, 2008, 2010, 2015) as a human’s ethics for their children. To sum, ‘Asians are inherently good at math’ discourses should be rephrased to Asian students and their parents put effort to understand U.S. mathematics. Also, Asian parents’ cold and fierce image as tiger parents can be changed to ‘caring’ parents and they are wishing their children belong society in the future.

The Reasoning for Providing Mathematics Support at Home

This part discusses the second research question: Why do Korean immigrant parents support their elementary-aged children’s mathematical meaning-making at home during the COVID-19 pandemic? The second research question explored the reasons for providing support.

Reasons for Providing support

In terms of reasons for providing support, parents provided four reasons: desire for their children to belong to this society and survive, filling gaps in low-quality of public education, financial or physical reasons for distance, and building a studying routine.

The first reason for providing mathematics education at home is that Korean immigrant parents desired their children to belong to this society, but they also perceived a glass ceiling in the U.S. And, they felt that they should support their children’s academic progress so that their children would become capable learners and also become a person who breaks through those glass ceilings toward them and overcome perpetual foreigner stereotypes as Korean, and Asian. Korean immigrant parents thought that STEM careers will be more accessible compared to literacy-related areas for their children. And, parents saw mathematical support as one of the possible ways to get close to glass ceilings for Asian populations although glass ceilings will last
forever. And, participating parents wished for overcoming perpetual foreigner stereotypes. The second reason for providing math support at home is that some parents were concerned about the quality of public schooling, and they felt they needed to fill the gaps at home with parental direct support. And, they worried that a teacher cannot meet all students’ educational needs and levels of education. The third reason was that although they wish to receive additional support from tutors or private education, financial reasons or physical distance let them teach their children by themselves. Last but not least reason was that building a studying routine for children’s long-term education. Korean immigrant parents believed that everyday study would build a study routine that might be connected to future self-motivated studying in later schooling. Jennifer and Sun Hwa highlighted that building a studying routine is important although the studying time is about 10-20 minutes per day. But, this also shows that the image of tiger parenting is misleading that does not align with the reasoning of parental support.

Taken together, the reason for providing mathematical support is that they wish their children can survive and have an independent life after K-12 education. Korean immigrant parents perceived that STEM subjects are more welcoming to their children as opposed to fields with an emphasis on language skills. Korean immigrant parents provide direct math support for their children because of their desire to belong to their children and live in society by overcoming their glass ceilings. Their support is meant for helping children’s understanding of mathematics. While putting their effort into children’s mathematics, Korean immigrants hope that their children can live independently in the U.S. after finishing schooling. Math is a hopeful way for helping their children’s living, and inclusion in the U.S.

*Perpetual Foreigner Stereotypes but hope*
Korean immigrant parents negotiated differences living in the U.S, but they have a strong desire for their children to belong and become capable learners. Korean immigrant parents mentioned that the second generation is viewed as a perpetual foreigner because of appearance. And, because of that, children of Korean immigrant families become more and more passive learners because of the lack of belonging and lack of teachers from different national origins. By giving examples of low call-out rates and becoming shy with a feeling of low connectedness to share topics in discussion sessions during the lessons.

Asians are good at mathematics discourse and were discussed in various ways among parents. Korean immigrant parents admitted that parental support is a crucial factor for that. And, based on their observations of their children, they said Asian students are observed in advanced-level mathematics classrooms. However, three parents mentioned that parental involvement is crucial to making difference. And, they mentioned the cultural backgrounds highlighting math in life. Korean parents’ perceived smartness was different in terms of innate smartness versus a brief daily practice with parental involvement.

With regard to tiger parents, Korean immigrant parents’ perspectives vary. Three Korean immigrant parents viewed themselves as not tiger parents. Two parents admitted they are doing tiger parenting in terms of supervising academic progress and having rules including time management disciplines. But, the degree of tiger parenting will be controversial since it could be subjective. Taken together, ‘Asians are good at mathematics’ rhetoric should be rephrased as Asian parents are putting their effort to help their children’s education, however, they are not all tiger parents, but they are just parents who desire for their children to belong to this society and overcoming perpetual foreigner stereotypes and glass ceilings.
Based on parents’ narratives, we may think of this circulation (See Figure 2). MMS, such as Asian students are good at math stereotypes, a low call-out rate, not many Asian (Korean) American teachers, those guided Korean American children become more passive learners. Those negatively influence the children’s belonging in a classroom. ‘Asian students are good at math’ stereotypes assume that they will already know about mathematics. However, some Korean immigrant students are not connected to math classrooms. Therefore, their passiveness could be more connected to their isolation than their mathematical ability. This aligns with the findings of Choi and Lim’s (2014) study that Asian students become self-silenced as their coping strategy.

**Figure 2**

*Negative Circulation of Becoming Passive Learners*
However, Korean immigrant parents shared their hope in narratives. By supporting mathematics, they tried to wish their children to belong to society. Based on Korean immigrant parents, I created their hope circulation (See Figure 3). Parents provide additional support for children’s mathematical meaning-making with code-switching and cultural negotiation, by wishing their children would become capable learners, break through the glass ceilings, and truly belong to society. But, these are Korean immigrant parents’ personal levels of input.

Figure 3

*Positive Circulation of Becoming Active Learners*
Systematic Support For Immigrant Families

I address systemic support for immigrant families in Figure 4, based on parents’ and their children’s narratives. And, this applies to multiple immigrant families.

First, educators can support immigrant parents by giving information sessions, to help their understanding of U.S. math in terms of language and culture. So that they can provide parent tutoring (Goudey, 2009) which helps their children’s academic skills for their children including mathematical meaning-making. Parents can teach and share their mathematics identities with their children (Prough, 2021). School teachers can collaborate with their student's parents to make a positive impact on learning mathematics.

Second, not only provide the information sessions, but we may also have a ‘Listening Sessions’ where immigrant parents can share their way of mathematical approaches with their children’s classroom teachers to share multicultural mathematics. So, teachers can learn different approaches from diverse parents’ mathematical meaning-making. Like, for example, a teacher can say, “I learned this from Ji Hoo’s mom yesterday, we can solve that way for today.” And, teachers can make connections with parents and children by sharing their experiences with each other as a community compared to participating parents who only relied on Korean online communities. By doing these, educators can value different approaches and perspectives. As Civil (2007) argues that community knowledge that is learning from minority parents and community would become assets for achieving equity in mathematics education, my recommendation would shed light on building strong belonging with parents’ community knowledge in mathematics education. Especially for immigrant parents who feel less belonging, they can be connected to school and curriculum and their desire to belong will spark to help their children’s academic success.
Third, teacher education programs in higher education systems may recruit and educate more Korean (Asian) American teachers who can reduce racial mismatch (McGrady & Reynolds, 2013). And, across the U.S., there is only two percent of Asian teachers (NCES, 2021). But, the composition of the subgroups of Asian American teachers’ national origin was not listed to distinguish each portion of students and teachers’ ratio. And, because of the unknown composition of the data, it is not feasible to look at the number of students and teachers from each subgroup among the Asian population. However, there was 6 percent of Asian American students in the U.S., and 2 percent of Asian American teachers still designate racial mismatch and the need for recruiting Asian American teachers (NCES, 2021). Similarly, Kokka and Chao (2020) address that Asian American teacher to Asian American students is the most mismatched number of all racial groups. And, having racial match between teachers and students positively influences academic performance of students (Brown, 2012; Kokka & Chao, 2020). Likewise, the narratives of Korean immigrant parents illustrate their desire to have more Korean American teachers in the classroom for their children to feel belonging.

In addition to the disproportionate ratio between the number of Asian teachers and students, model minority stereotypes were not always beneficial to Asian students’ belonging, rather they led to low levels of participation with a low call-out rate. Participants’ narratives reconfirm McKinney de Royston et al.’s (2021) findings that students feel they are cared for by having the same race teachers with understanding students’ backgrounds. This also highlights that the higher education system needs to recruit diverse preservice teachers who may dedicate to building up a rapport with students who came from the underrepresented population. By having more diverse teachers at schools, students will have more opportunities to speak out their voices and not become passive learners.
Fourth, teacher education programs in higher education systems may educate teachers about immigrant experiences so that they can care about belonging and demystify racial myths and racial narratives (Nasir & Shah, 2011) that make barriers among diverse learners. By doing so, Asian students and multiple ethnic students can become active learners. Taken together, we educators may provide more inclusive, systematic support for immigrant families and their children.

**Figure 4**

*Systematic Support For Immigrant Families*

1. Information sessions (U.S. math), Parents as tutors (Goudey, 2009).
2. Listening Session (Parents can share their ways)
3. Increasing the Asian American teachers and reduce racial mismatch (McGrady & Reynolds, 2013)
4. Supporting belonging (demystifying myth)
The COVID-19 Pandemic

Their narratives uncover the COVID-19 pandemic and how it impacted parents’ and children’s math learning and their ways of support. The COVID-19 influenced both positive and negative ways for Korean immigrant parents. They put effort into children's learning, but additional duties are challenging for them. The positive things were having an online platform with a transparent evaluation that helped to support their children’s progress, and they appreciated more time to support. The disadvantage is an increased amount of physical support, lunch, supervision, and monitoring of children’s attention in remote schooling. In addition, some participating parents were concerned about their children’s future will be safe and inclusive during the pandemic.

Limitation

One of the limitations of this study is that this includes only five families’ narratives. That means there would be some Korean immigrant families’ stories. And, this project listened to a very specific group of Korean immigrant parents: According to Y. Kim et al. (2018), providing academic supporting parents is 7.8% (p. 132). Accordingly, this study had the biggest challenges in recruitment procedures due to the narrow scope of the inclusion criteria. This suggests that the current research adds value to understanding the underrepresented population’s narratives. Last but not least, the observation data with my interpretation could not be a direct representation, however, the debriefing session data somehow covers the reasoning of participating parents’ ways of being. I see the value of observation sessions that include parents and children with two languages that I have access to with bilingual understanding in the observation session.
Conclusion

Although Korean immigrant families are one of the highly increasing immigrant populations, there has not been much studied about how Korean immigrant parents negotiate mathematical meaning. Accordingly, I address that ‘Asians are inherently good at math’ discourses should be rephrased to Asian American students and their parents who put effort to understand U.S. mathematics. And, the cold and fierce image of tiger parents can be changed to ‘caring’ parents, and they are wishing for children’s belonging in the future. This is because participating parents’ desires for their children to belong guided them to support children’s mathematical meaning-making. Their ways of interaction uncover their difficulties and negotiation which is similar to a winding road (See Figure 5).

Figure 5

Contrasting Images Toward Asian American

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<tr>
<th>Image from the surface level of Asian</th>
<th>The reality of the Asian parents’ and their children</th>
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This study addresses Korean immigrant parents’ use of code-switching, cultural negotiation, and sharing identities to build up mathematical meaning at home during the COVID-
19 pandemic. I introduced the five forms of mathematical code-switching, and cultural
negotiation in language, identities, and seeking information. My study uncovers language and
culture are interrelated to make conceptual differences in mathematics, and immigrant families
need to understand U.S. mathematics. Also, they shared their reasoning for providing direct math
support by wishing their children to belong.

Observing and talking to immigrant parents about their support and their children’s
efforts in mathematics highlights the cultural and language supports needed for their children to
be successful in U.S. mathematics classrooms. While they admit the existence of stereotypes
(perpetual foreigner stereotypes, model minority stereotypes, and Asian students are good at
mathematics), the data support that Korean immigrant parents and children negotiate with culture
and language differences in lack of information. Due to living in the U.S., parents relied on the
online Korean community such as Missy USA. At the same time, they have a strong desire for
their children to belong and become capable learners.

The COVID-19 pandemic has disrupted everyone’s life, and this also affected Asian
Americans’ and Korean Americans’ ways of being. They were attacked, killed, and hated by
others based on their appearance, race, and ethnic backgrounds (FBI, 2020). Being looked at as
tiger parents, model minority, and perpetual foreigners, Korean immigrant parents shared their
continuous hope that their next generation will break through some layers of the glass ceilings in
the future. And, parents are concerned that the COVID-19 pandemic impacted the achievement
gap, and that shows the need for supporting immigrant families who are less familiar with U.S.
mathematics. Korean immigrant parents are trying to overcome this by putting time and effort
into their children’s mathematical learning at home during the pandemic. And, their wish is that
their children can survive in this society. When their children can grow up, their children can have an independent life without parental support.

Furthermore, I changed to systematic support for immigrant parents by providing explanation sessions about U.S. math terms. So that they can become tutors for their children about mathematical meaning-making. By supporting parents, they can become parent tutors (Goudey, 2009) who explain to their children, that their children will become successful living in the U.S. And, teacher education programs may recruit and educate more diverse pre-service teachers to become various same-race teachers including Asian American teachers and Korean American teachers. And, teacher education programs can provide culturally relevant pedagogy to help immigrant families’ children and demystify racial myths that divide diverse learners and weaken their belonging. So, immigrant families' children become successful living in the U.S. with strong roots. Ultimately, my research unveils their struggles and negotiations within different curriculums and cultures, which would benefit diversity and equity in education like awareness toward care for them and different languages and cultural contexts that become hurdles in learning mathematics.
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Appendix A

Recruitment Flyer & Preliminary screening questionnaire

Recruitment Flyer

Hello. I am studying a doctoral program, specialized in Mathematics Education at the University of Wisconsin-Madison. I worked as an elementary teacher in Korea for 6 years. I am currently working on a dissertation “Korean Immigrant Parents’ Ways and Reasons to Support their Children’s Mathematical Meaning-Making at Home during the COVID-19 Pandemic”.

I heard that Korean parents are eagerly supporting their children at home. I want to listen to parents’ voices about how to support children’s mathematics at home during a pandemic.

Although there has been several research about immigrants, Korean immigrants’ support and their voices were not highlighted before.

If you are a Korean mom (or dad) of elementary students and directly support math at home, you may be eligible to participate in this study. Participation will include 3 interviews and 2 observations. Your participation will require approximately 6 hours of your time total. In exchange for your participation, I will provide 2 free 30-minute tutoring sessions for your child.

My email address is ysung27@wisc.edu. If you send me an email, I will send a Zoom link to discuss the study. Thank you for your interest.
연구에 참여하시는 분들에게는 소정의 답례로 연구 종료후, 초등자녀분 Zoom call 로 1 대 1로 2 주간 (1 주에 30 분씩 2 회, 총 60 분) 무료튜터링 해드립니다.

제 이메일 주소는 ysung27@wisc.edu입니다. 이메일로 참여의사를 보내주시면 연구에 대한 논의를 위해 줄 링크를 보내드리도록 하겠습니다. 관심을 가졌주시서 감사합니다.

Preliminary screening questionnaire. (5 mins interview-3 questions)

1. Were you and your spouse born in Korea? Did you (and your spouse) come to the U.S. by your decision (coming as an adult)? 귀하와 배우자분께서는 한국에서 출생하시고 성인이 된 후에 미국에 오셨습니까?

2. Did your child(ren) attend the U.S. elementary school for at least 3 years? 자녀분께서는 미국 초등학교에 적어도 3 년간 다녔습니까? 이는 미국에서 코로나 이전/중의 학교생활을 해 본 적이 있음을 의미합니다.

3. Do you directly support your children’s mathematics at home? 집에서 직접 자녀분의 수학공부를 돕고 계십니까?
Appendix B

Interview 1 Questions (90 mins)-Backgrounds and thinking, language, and the COVID-19 pandemic

1. Did you come to the U.S. by your decision (coming as an adult)? How did you come to the U.S.? (including your background information such as age ranges (the 30s, 40s), time in the U.S. including immigration year, citizenship or green card holder or working-visa.
2. What is your job? Are you a homemaker?, or do you have a career (including spouse’s occupation)?
3. Can you self-define your social status-like middle class?
4. Since the U.S. is a huge country and has various backgrounds based on the school district, could you tell me where you are located? Which school districts do you send your child(ren)? (This is to figure out your children’s general school district atmosphere)
5. Can you tell me about your children? (number of children, the grade of children, academic interests in general, and so on)
6. Does your child speak both English and Korean?
   a. (If they say their children cannot speak both languages, just skip this question) Since your child is speaking two languages, do you think this is good for him in school? Or is it hard to catch up on school content?
7. How do you think that a school is a primary location to learn? Or, additional supportive place in addition to tutoring, cram schooling, or a summer program of an accelerated curriculum?
8. How do you perceive a teacher’s role and responsibility in terms of learning? (Evaluator? A supporter?) Or, do you think a student is a responsible individual for their achievement? Or, do you believe the mathematics curriculum has a problem taking responsibility for the students’ mathematical struggle?
9. Please share your math experience: Could you explain your mathematics experiences and degree of favor to math when you were in school? Have you thought about yourself as a SUPOJA (person who gives up to engage in math learning) or the opposite?
   a. Do you think your child also (dis)like mathematics?
   b. If your child likes (or dislikes) math, can you share its reason?
10. During the COVID-19 pandemic, parents and their children might be studying at home, but recently I have heard the school is going back to provide face-to-face sessions. Please share your situation, change/maintain your way of supporting your children’s academic progress.
11. How do you support your children’s mathematics learning? Direct Supporting home assignment? Or checking them? or helping with a workbook, or worksheet, or sending them to summer camp, online lectures, cram school, or hiring a math tutor?
   a. Do you have any difficulties (or strengths) in supporting mathematics at home?

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<thead>
<tr>
<th>English &amp; Korean Interview Questions</th>
<th>영어 (한국어) 인터뷰 질문지</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Interview 1 questions (90 mins).</strong> 인터뷰 1 질문지 (90 분)</td>
<td></td>
</tr>
</tbody>
</table>
3. Can you self-define your social status-like middle class? 가족이 경제적으로 어느 정도에 속하신다고 (중산층에 속하신다고 생각하시는지) 생각하시는 지 이야기해 주세요.

4. Since the U.S. is a huge country and has various backgrounds based on the school district, could you tell me about where you are located? Which school districts do you send your child(ren)?--This is to figure out your children’s general school district atmosphere. (미국은 매우 큰 나라이기에 지역적 차이가 크다고 알고 있습니다. 배경에 대해 알기 위해 자녀봉이 속한 학군명과 학군에 대해서 말씀해 주세요. --자녀봉의 주변의 인종적 다양성 등 배경에 대해 전반적으로 이해하기 위한 질문입니다.)

5. Can you tell me about your children? (number of children, the grade of children, academic interests in general, and so on) 자녀분에 대해서 말씀해 주세요. 자녀분의 학년이나, 자녀수, 학습에 대한 전반적 홍미, 등등요.

6. Does your child speak both English and Korean? (자녀분이 영어 한국어 둘 다 잘 하시나요?)
   a. (If they say their children cannot speak both languages, or just skip this question) Since your child is speaking two languages, do you think this is good for him in school? Or is it hard to catch up on school content? (자녀봉이 두 언어를 잘 하는 것이 학업에도 도움을 줄라고 생각하시나요?)

7. How do you think that a school is a primary location to learn? Or, additional supportive place in addition to tutoring, cram schooling, or a summer program of an accelerated curriculum? (학교가 배움의 본봉 장소라고 생각하시나요? 아니면 선행학습 등의 사교육에 대해서 도움을 주는 곳이라고 생각하시나요?)

8. How do you perceive a teacher's role and responsibility in terms of learning? (Evaluator? A supporter?) Or, do you think a student is a responsible individual for their achievement? Or, do you believe the mathematics curriculum has a problem taking responsibility for the students’ mathematical struggle? (교사의 역할이 학습에서 어떠해야 하다고 생각하세요? (예를 들어, 평가자? 도우미?) 또는, 학생이 학습에 있어서 주로 스스로의 책임이라고 생각하시나요? 아니면, 커리큘럼 구성에 책임이 있다고 보시나요?)

9. Please share your math experience: Could you explain your mathematics experiences and degree of favor to math when you were in school? Have you thought about yourself as a SUPOJA (person who gives up to engage in math learning) or the opposite? (학창시절 수학을 좋아하셨나요? 아니면 흔히 수포자이셨나요?)
   a. Do you think your child also (dis)like mathematics?(자녀봉도 수학을 좋아하거나 싫어하시나요?)
   b. If your child likes (or dislikes) math, can you share its reason?(자녀봉이 수학을 좋아하거나 싫어하는 그 이유가 무엇일까요?)
   c. Are you satisfied with your children’s school mathematics performances or grades in mathematics classrooms? (자녀봉의 학교에서의 수학성취도에 대해서 만족하실까요?)

10. During the COVID-19 pandemic, parents and their children might be studying at home, but recently I have heard the school is going back to provide face-to-face sessions. Please share your situation, change/maintain your way of supporting your children’s academic progress. (코로나로 아이들이 집에서 학습하거나 온라인 수업을 받았는데, 요새는 다시 학교가 문을 열고 대면 수업을 재개한다고 들었습니다. 현재 해당 학군은 상황이 어떡신가요? 코로나 전과 코로나 한 가운데의 상황 속에서, 혹은 집에서 하는 학습이나 습득 등은 전과 달라진 점이 있나요?)

11. How do you support your children’s mathematics learning? Direct Supporting home assignment? Or checking them? or helping with a workbook, or worksheet, or sending them to
summer camp, online lectures, cram school, or hiring a math tutor? (수학학습에서는 어떻게 도와주시는 편입니까? 숙제 체크를 하신다거나, 문제집을 풀어본다거나, 문제지를 프린트 하시거나, 여름 캠프를 보내거나, 온라인 강의를 듣게한다거나, 학원을 보내거나, 개인과외를 한다든지, 등등 어떤 도움을 택하셨나요?)
a. Do you have any difficulties (or strengths) in supporting mathematics at home? (혹시 수학학습을 도와주실 때 어떤 어려움이나 잘하고 계신 점이 있으신가요?)
Appendix C
Interview 2 Questions (90 mins)-Cultural Socialization

1. Have you ever heard about Korean education fever? How do you think of it? In the U.S. the education fever still exist? Or, it changes or disappear? How do you feel about education fever in the U.S.
2. Some people believe that America has a better opportunity including living, academic, and career than Korea. Do you believe American dream? How do you feel about immigration as an opportunity for your children? Or, hardship for them?
3. Have you ever faced marginalization? Have you (or your children) ever faced a glass ceiling living in the U.S.?
4. How do you see differences and similarities in math (learning environment, curriculum) in Korea and the U.S? What kinds of positive things or negative parts of curriculum in the two countries?
   a. Since coming to the United States, what types of differences and difficulties in the mathematics of your children have you experienced?
5. Have you received any additional support for your child(ren)’s learning from the local Korean community or the online Korean community (such as Missy USA), church (Korean church or local church), or the local community in your area?
6. In the U.S., it is popular to say Asians are good at math. Have you ever heard that “Asians are good at mathematics?” What do you think?
7. How do you think of your support as helpful? Or, is it burdensome to your children’s learning?
8. Have you ever heard Asian moms are tiger moms who strictly supervise their children’s academic progress? How do you define yourself as a Tiger mom? Helicopter mom? Or giving more freedom to your children?
9. Have you thought about why Asians are more prevalent in the STEM area? Do you think there is any reason for them?
10. If there are novice parents who just immigrated to the U.S., do you have any educational advice to help them? (Or, if you need advice, what kind of support do you really need for children’s education?)

English & Korean Interview Questions
영어 (한국어) 인터뷰 질문지

Interview 2questions (90 mins). 인터뷰 2 질문지 (90 분)

2. Some people believe that America has a better opportunity including living, academic, and career than Korea. Do you believe American dream? How do you feel about immigration as an opportunity for your children? Or, hardship for them? ( 어떤 분들은 미국의 기회의 땅이라고 말합니다. 삶의 질, 교육의 질, 직업 등에 있어서요. 어머님(아버님)도 어메리칸 드림을 이뤄가고 계신가요? 자녀분들에게 한국에서 사는 것보다 더 나은 교육적 기회를 주었다고 생각하시는가요? 아니면 여러 문화적 차이로 어려움이 더 많다고 생각하시는가요?)
3. Have you ever faced marginalization? Have you (or your children) ever faced a glass ceiling living in the U.S.? (미국에서 살면서 주류가 아닌 소수민족이라고 느껴보신 적이 있으신가요? 부모님께서(또는 자녀분께서) 유리천장을 느껴보신 적이 있으신가요?)
4. How do you see differences and similarities in math (learning environment, curriculum) in Korea and the U.S? What kinds of positive things or negative parts of curriculum in the two
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countries? (미국과 한국의 교육 환경이나 교육과정에 어떤 차이가 있는 것 같으세요?)

a. Since coming to the United States, what types of differences and difficulties in the mathematics of your children have you experienced? (수학적 차이는 어떻게 느껴요? 한국 수학의 장단점과 미국 수학의 장단점을 알려주십시오.)

5. Have you received any additional support for your child(ren)’s learning from the local Korean community or the online Korean community (such as Missy USA), church (Korean church or local church), or the local community in your area? (혹시 다른 커뮤니티에서 자녀교육에 도움 받으셨나요? 같은 지역의 한인 커뮤니티나 온라인 한인 커뮤니티, 교회, 미국의 지역사회 등에서 자녀교육에 도움을 받아보신 적이 있으신가요?)

6. In the U.S., it is popular to say Asians are good at math. Have you ever heard that “Asians are good at mathematics?” What do you think? (미국에서 동양아이들이 수학을 잘한다는 말이 있는데, 어떻게 생각하세요?)

7. How do you think of your support as helpful? Or, is it burdensome to your children’s learning? (부모로서의 교육적 개입이 자녀의 학습에 도움이 된다고 생각하시나요? 아니면 아이에게 학습에 대한 부담감을 줄 수 있다고 생각하시나요?)


9. Have you thought about Asians being more prevalent in the STEM area? (혹시 동양 사람들이 STEM--과학기술엔지니어링 수학 또는 이공계 및 의학--에 많이 종사한다고 생각해보셨나요?)

10. If there are novice parents who just immigrated to the U.S., do you have any educational advice to help them? (Or, if you need advice, what kind of support do you really need for children’s education?) (혹시 만약 미국에 이민 온 지 얼마 안 된 다른 부모가 있다면, 교육적으로 조언 해주고 싶은 말씀이 있으실까요? (아니면 자녀 교육에 조언을 받고 싶으신 부분이 있으시면 어떠한 부분이 필요하신지 말씀해주세요.)

For the next meeting, I will observe (turn on the Zoom) your interaction about mathematics learning with your children. Thank you so much. 다음 시간은 부모님께서 어떻게 자녀분의 수학을 도와주시는지 관찰하게 됩니다. 감사합니다.
Appendix D

Interview 3. Questions-Meaning-Making (90 mins)

1. I could see you are trying to make mathematical meaning (observed) this way. How did you find and prepare your resources?
2. You are using (Korean, English, or both) during interactions. How does this mean for you and your children? (Children also can answer)
3. (for children) You are doing such a great job on this task. What helps to build up its meaning? (for children)
4. How can this kind of mathematical strength continue? Or, How can this mathematical weakness be overcome?
5. (for parents) How much home-math learning is helpful for your children?
6. (for children) How much home-math learning is helpful for your school math?
7. Have you ever thought about any kind of support needed for your children’s mathematics learning? For example, do you wish to receive any kind of support from the school, teacher, community (Korean community, or U.S. community), free online lecture, workbooks
8. If you are satisfied (or struggled) with your children’s mathematical academic progress, could you share your supporting story in children’s mathematics? If you are not satisfied with your children’s learning, what kinds of support do you need? What could we (other Korean Immigrant Parents) learn from this?
9. Last but not least, if you have ideas or opinions on mathematics learning, please share them with us.
children’s learning, what kinds of support do you need? What could we (other Korean Immigrant Parents) learn from this? (만약 자녀의 수학을 도와주시는데 만족하셨다면 (혹은, 어려움이 있으면서), 그 이야기를 좀 더 해주실 수 있나요? 만족 못하신다면, 어떤 부분의 도움이 필요하다고 느끼시나요? 다른 한국분이나, 선생님들이나, 우리가 무엇을 배울 수 있을까요?)

9. Last but not least, if you have ideas or opinions in mathematics learning, please share it for us. 마지막으로 수학학습에 대한 아이디어나 생각이 더 있으시다면 나눠주시면 감사하겠습니다.
Appendix E

Observation Criteria (Focusing on Meaning-Making)

The aim of the observation is how the meaning-making happens to overcome cultural barriers (language, culture, curriculum, and the COVID-19 pandemic). The observation session will involve the researcher attending (virtually) and observing the support of parents with children and mathematics that they agree on. Each observation session includes the observation that would be approximately 40 minutes, and 20 minutes debrief to clarify interactions and thoughts from the event.

<table>
<thead>
<tr>
<th>Researcher’s observation criteria</th>
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<tbody>
<tr>
<td>● What kinds of resources that they use to help children’s understanding? (homework, workbook, websites)</td>
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<tr>
<td>● How do parents and students deal with difficult (or culturally different) concepts?</td>
</tr>
<tr>
<td>● How do parents and students use language during mathematics learning? (code-switching)</td>
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<tr>
<td>● What I notice the meaning-making is going (language, scaffoldings, representations, gestures)?</td>
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<tr>
<td>● Do they use visual representations to help build up meaning? (either Korean context, or Western context)</td>
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<tr>
<td>● How do they praise?</td>
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</table>

Debriefing Questions in Observation Sessions

<table>
<thead>
<tr>
<th>Debriefing Questions</th>
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<tbody>
<tr>
<td>● During the observation, I could see this, (What I have found, such as conversations, relationships, and mathematical expressions between two cultures, strength or struggling, or praising and cheering students), do you have a reason to do this? (Maybe the order of the questions will be a little bit changed by the interviewees’ responses)</td>
</tr>
<tr>
<td>● 관찰 과정 중에, 저는 이러한 모습을 보았습니다. (대화, 관계, 수학적 표현 및 문화적 표현, 강점과 어려움, 그리고 아이를 격려하는 모습 등) 혹시 자세한 설명을 더 해주실 수 있나요?</td>
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</table>
Appendix F

UNIVERSITY OF WISCONSIN-MADISON
Research Participant Information and Consent Form

Title of the Study: Korean Immigrant Parents’ Ways and Reasons to Support their Children’s Mathematical Meaning-Making at Home during the COVID-19 Pandemic

Principal Investigator: Erika Bullock (phone: (608) 263 - 1955 email: ecbullock@wisc.edu) 
Student Researcher: Yewon Sung (phone: (608) 571-2955 email: ysung27@wisc.edu)

DESCRIPTION OF THE RESEARCH

You are invited to participate in a research study about how Korean immigrant parents of elementary-aged students support their children’s mathematics education at home during the COVID-19 pandemic. You have been asked to participate because, as a person who is a Korean immigrant parent of elementary-aged children, you have unique experiences of living in two different countries and involved supporting your child(ren)’s mathematics at home.

The purpose of the research is to understand how Korean parents of elementary-aged students in the U.S. support their children’s mathematics education at home during the COVID-19 pandemic. This study will include a sample of people who mother children in elementary school.

Interviews for this study will be conducted through a virtual space, such as Zoom, at a time of your choosing. This should be a quiet and private location for both you and the researcher. Video recordings and field notes will be made of your participation. Video recordings will only be listened to by approved personnel. The field notes, transcriptions, and video recordings will be moved to a password-protected online site and will be retained for 7 years after the completion of the study.

WHAT WILL MY PARTICIPATION INVOLVE?
If you decide to participate in this research you will be asked to complete 3 interviews (approximately 90 minutes each) and two observations (60 minutes each), with a total time of approximately 6 hours to 8 hours.

The interviews will involve answering questions about your personal background, your mathematical experiences, and the home support you have with your children in math. You may decline to answer any of the questions as you so choose. Each interview will last approximately 1.5 hours.

The observation session will involve the researcher attending (in virtually) and observing support with your children and mathematics that you agree on. Each observation should be approximately 40 minutes. These may occur in a private space (e.g. house with the Zoom call). Following each observation will be a brief 20 minute debrief to clarify interactions and thoughts from the event.

The order of the participation and timeline

<table>
<thead>
<tr>
<th>Interview 1</th>
<th>Interview 2</th>
<th>Observation 1</th>
<th>Observation 2</th>
<th>Interview 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 mins</td>
<td>90 mins</td>
<td>60 mins</td>
<td>60 mins</td>
<td>90 mins</td>
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</tbody>
</table>

Since the observation sessions will involve the participation of you and your children, there is an additional line to confirm your consent of your children being indirectly and directly involved in the study. The same confidentiality protections (described below) will be extended to your children.
This study would also like to collect artifacts related to math and what that means, ie. worksheets, completed math problems, etc. You may be asked throughout the interviews, observation, or debrief sessions for materials that support your experiences, such as books, online resources, photographs, or video clips. The researcher may ask for a copy of such relevant materials. You may decline to share copies of any request materials.

**COMPENSATION**

If you decide to participate, your participating child will receive two 30-minute tutoring sessions as a thank you for your time at the conclusion of your last interview.

**ARE THERE ANY RISKS TO ME?**

The risk that participants may reveal personal, sensitive, or identifiable information when responding to open-ended questions. Some people may feel that sharing about their academic background, their personal experiences, or parenting activity is uncomfortable. In the interview, responses to all questions are voluntary. You may decline to answer any of the questions.

Online interviews and observations conducted via Zoom, the virtual platform security cannot be guaranteed. There is always a risk of a breach of confidentiality, but we will make every effort to keep your identity confidential.

**ARE THERE ANY BENEFITS TO ME?**

There are no direct benefits to your participation in the study. However, your participation would benefit indirectly future teacher training programs or future research. The expected benefit of this study is to highlight the efforts of Korean immigrant parents and children’s home learning throughout the pandemic.

**HOW WILL MY CONFIDENTIALITY BE PROTECTED?**

The results of this study may be published, but your name will not be used.
스터디의 모든 데이터가 안전하게 저장됩니다. 식별가능한 개인 정보 또는 중요한 정보는 오디오 녹음에서 제거되며 스크립트나 출판물에 포함되지 않습니다. 연구원들은 연구관찰 가정에서 아동학대 또는 방치가 의심되거나 목격될 경우에는 기밀을 깨게 될 수도 있습니다. While there will likely be publications as a result of this study, your name will not be used. All data from the study will be stored securely. Any personal, identifiable, or sensitive information will be removed from the video recordings and will not be included in transcripts or publications. Researchers will be required to break confidentiality if abuse or neglect is suspected or witnessed while in your home.

연구에 참여하신다면 위하의 이름을 사용하지 않고 가명으로 대화내용을 인용하여 게재하게 됩니다. 본 연구에 참여하는 데 동의하는 경우, 출판물에 인용을 허용하시는 것이 동의하게 됩니다. 미래의 연구에 본 데이터가 사용되더라도 모든 정보는 가명으로 보호됩니다.

If you participate in this study, we would like to be able to quote you directly without using your name. If you agree to participate in this study, you are allowing us to quote you in publications. When the data is used in the future, all data will be de-identified if kept for this purpose to the consent.

WHOM SHOULD I CONTACT IF I HAVE QUESTIONS?
언제든지 연구에 대한 질문을 하실 수 있습니다. 오늘 이후 연구에 대해 궁금한 점이 있으시면 ecbullock@wisc.edu 의 에리카 불록 교수에게 연락하실 수 있습니다. 귀하는 성예원 대학원생 연구원에게 ysung27@wisc.edu 으로 연락 하셔도 됩니다.
You may ask any questions about the research at any time. If you have questions about the research after you leave today, you should contact Principal Investigator Erika Bullock at ecbullock@wisc.edu. You may also contact the student researcher, Yewon Sung at ysung27@wisc.edu.

연구팀의 반응에 만족하지 못하시거나, 더 궁금한 점이 있거나, 연구 참여자로서 자신의 권리에 대해 누군가와 이야기하고 싶으시다면 (608) 263-2320 으로 위스콘신 대학교 교육사회행동과학 연구윤리위원회 IRB 사무소에 문의하실 수 있습니다.

If you are not satisfied with the response of the research team, have more questions, or want to talk with someone about your rights as a research participant, you should contact the Education and Social/Behavioral Science IRB Office at (608) 263-2320.
여러분의 참여는 전적으로 자발적입니다. 만약 당신이 연구에 참여하지 않으시거나 탈퇴하시기로 결정한다면, 당신은 패널티 없이 그렇게 할 수 있습니다.

Your participation is completely voluntary. If you decide not to participate or to withdraw from the study, you may do so without penalty.
종이 사본이 주어진 경우, 서명에 본 동의서를 잃었으며, 본 연구에 대한 참여에 대해 질문하고 자발적으로 참여에 동의하였음을 나타냅니다. 전자 사본을 받는 경우 아래에 이름과 이니셜을 입력하면 본 동의서를 잃고 본 연구에 대한 참여에 대해 질문하실
귀하께서는 평하신 언어로 인터뷰와 관찰에 참여 하시면 됩니다. 한국어, 영어, 또는 두 가지 모두 사용하시도 됩니다.
You may choose preferred languages such as Korean, English, or both languages during the interviews and observation sessions.

Name of Participant (please print):________________________________________________________

Signature(서명) __________________________ Signature Date (날짜)____________________

I give my permission to be video recorded in the interviews, observations, artifacts, and debriefs. I give my permission for my children to be observed and video recorded in the observation activities. 저는 인터뷰, 관찰, 관련자료, 추가 질문에 참여하도록 허락하며, 녹화에 동의합니다. 또한 제 자녀가 참여하고 녹음되는 것도 허락합니다.
Appendix G

UNIVERSITY OF WISCONSIN-MADISON
Research Participant Information and Assent Form (for Children)

Title of the Study: Korean Immigrant Parents’ Ways and Reasons to Support their Children’s Mathematical Meaning-Making at Home during the COVID-19 Pandemic

Principal Investigator: Erika Bullock (phone: (608) 263 - 1955 email: ecbullock@wisc.edu)

Student Researcher: Yewon Sung (phone: (608) 571-2955 email: ysung27@wisc.edu)

My name is Yewon Sung who is a doctoral student at University of Wisconsin-Madison. We are asking you to be in a research study because we are trying to learn more about how Korean parents and their children learn mathematics at home during the COVID-19 pandemic.

If you agree to participate in this study, your interaction with your parent(s) will be observed via Zoom and you may be asked several questions about mathematics activities and how you think. At the end of the research, if you want, you may ask several mathematics questions.

Please talk this over with your parents before you decide whether or not to do this. We will also ask your parents if it is okay for you to be in this study. But even if your parents say “yes” you can still decide not to do this.

If you don’t want to be in the study, you don’t have to participate. Remember, being in this study is up to you and no one will be upset if you don’t want to participate or even if you change your mind later and want to stop.

You can ask any questions about the study. If you have a question later you can email ysung27@wisc.edu or call me (608) 571-2955 or ask me next time.

Signing your name at the bottom means that you agree to be in this study.
You may choose preferred languages such as Korean, English, or both languages during the interviews and observation sessions.

Your statement:
This research has been explained to me. I agree to take part in this study. I have had a chance to ask questions. If I have more questions, I can ask the researcher.

_______________________________________________

자녀분 자필 서명 Your signature (Children)

날짜 Date