T.C.

MARMARA UNIVERSITY

INSTITUTE OF EDUCATIONAL SCIENCES

DEPARTMENT OF EDUCATIONAL SCIENCES

PROGRAM OF INTERNATIONAL AND COMPARATIVE EDUCATION

MATHEMATICS LEARNING DIFFICULTIES AMONG IMMIGRANT PRIMARY SCHOOL STUDENTS: A META-SYNTHESIS STUDY

HADIL M F ABUALI

(Master's Thesis)

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GÖÇMEN İLKOKUL ÖĞRENCİLERİNDE MATEMATİK ÖĞRENME GÜÇLÜKLERİ: BİR META-SENTEZ ÇALIŞMASI

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ETHICAL STATEMENT

In my study prepared in accordance with the Graduate Thesis Writing Guide of the Marmara University Institute of Educational Sciences:

- I declare that I obtained the presented information, documents and data within the framework of academic and ethical rules.
- I indicate that I have cited and referenced all the works I have used in my study.
- I affirm that I have not made any changes to the obtained data and results and I accept all potential legal consequences against me in case of any contrary situation.

20 / 06 / 2023

HADIL M F ABUALI

APPROVAL

This study prepared by HADIL M F ABUALI on “Mathematics Learning Difficulties Among Immigrant Primary School Students: A Meta-Synthesis Study” was found successful by the following jury members as a result of the defense examination held on 20 / 06 / 2023 and was accepted as a Master’s thesis.

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ACKNOWLEDGMENT

This thesis originated from a process of dialogue regarding the distinct challenges that immigrant students encounter while acquiring proficiency in mathematics. The genesis of this process was not a single moment, but rather a journey. The conversation sparked a flame that led to extensive exploration and shaped the core of this academic pursuit. This thesis is motivated by a strong desire to enhance comprehension of the intricate matter at hand and make a meaningful contribution towards its resolution.

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ABSTRACT

Mathematics learning difficulties among immigrant students have been recognized as a significant problem in primary schools, with different issues such as language barriers, cultural differences and socioeconomic factors may cause these difficulties. The purpose of this study is to analyse the mathematics learning difficulties reported in the literature that immigrant students have in mathematics learning while they are enrolled in primary school and to find effective strategies that may be employed to promote the students' academic growth. To address this issue, meta-synthesis of existing literature was conducted analyse Through a systematic review and synthesis of existing literature published between 2010 and 2023.

The findings revealed that the barriers of mathematics learning are five main categories: language barriers, cultural differences, socio-economic challenges, psychological factors, educational background and prior knowledge. Language barriers include the issues of mathematical vocabulary and terminology, symbols and notation, language in word problems and instructions and comprehension and expression of mathematical ideas. Cultural differences include the issues of cultural beliefs, values and practices in mathematics education; cultural conventions and expectations in the educational system; classroom norms and behaviours; and cultural influences on problem-solving strategies. Socio-economic challenges include issues of low-income backgrounds, access to educational resources, quality of instruction and learning materials and opportunities for academic support. Psychological factors include factors of mathematics anxiety, self-efficacy and confidence in mathematics, motivation and engagement in learning and social and emotional adjustment in the host country's educational system. Educational background and prior knowledge include issues of differences in mathematics curricula across countries, quality and consistency of previous mathematics instruction, gaps in knowledge and understanding of mathematical concepts and familiarity with instructional approaches and assessment practices.

The literature meta-synthesis spanning has revealed a number of efficacious strategies including; culturally responsive teaching, language support, peer support and

collaborative learning, differentiated instruction, parental involvement and family support, professional development and teacher training. The study recommends that educators and policymakers work together to implement these strategies and interventions to enhance the mathematics learning experiences of immigrant students. Limitations of the study include potential biases in the literature reviewed and the generalizability of the findings. The study contributes to the existing knowledge on mathematics learning difficulties among immigrant students and highlights the need for continued research in this area.

Keywords: mathematics learning, immigrant students, learning difficulties, language barriers, cultural differences, socioeconomic factors

ÖZET

İlkokul düzeyinde göçmen öğrenciler arasındaki dil engelleri, kültürel farklılıklar ve sosyoekonomik faktörler gibi farklı sorunlar, matematik öğrenme güçlüklerine neden olabilmektedir. Bu çalışmanın amacı, literatürde göçmen öğrencilerin ilkokula devam ederken matematik öğreniminde yaşadıkları matematik öğrenme güçlüklerini analiz etmek ve öğrencilerin akademik gelişimini desteklemek için kullanılabilecek etkili stratejileri tespit etmektir. Bu konuyu ele alabilmek için, 2010 – 2023 yılları arasında yer alan mevcut literatürün sistematik bir incelemesi ve sentezi meta-sentez yönteminden faydalanılarak analiz edildi.

Bulgular, matematik öğrenimindeki engellerin beş ana kategoride olduğunu göstermektedir. Bunlar; dil engelleri, kültürel farklılıklar, sosyo-ekonomik zorluklar, psikolojik faktörler, eğitim geçmişi ve önceki bilgilerdir. Dil engelleri; matematiksel kelime dağarcığı ve terminolojisi, semboller ve gösterim, kelime problemlerinde ve yönergelerde dil ve matematiksel fikirlerin anlaşılması ve ifade edilmesi konularını içermektedir. Kültürel farklılıklar; matematik eğitimindeki kültürel inançlar, değerler ve uygulamalar; eğitim sistemindeki kültürel gelenekler ve beklentiler; sınıf normları ve davranışları ve problem çözme stratejileri üzerindeki kültürel etkileri içermektedir. Sosyo-ekonomik zorluklar; düşük gelirli aile geçmişi, eğitim kaynaklarına erişim, öğretim ve öğrenme materyallerinin kalitesi ve akademik destek için fırsatlar şeklindedir. Psikolojik faktörler; ev sahibi ülkenin eğitim sistemindeki matematik kaygısı, matematiğe öz yeterlik ve güven, öğrenme motivasyonu ve katılım ve sosyal ve duygusal uyum faktörlerini içerir. Eğitim geçmişi ve önceki bilgiler; ülkeler arasında matematik müfredatındaki farklılıklar, önceki matematik eğitiminin kalitesi ve tutarlılığı, matematiksel kavramlarının bilgi ve anlayışındaki boşluklar ve öğretim yaklaşımları ve değerlendirme uygulamalarına aşinalık konularını içermektedir.

Gerçekleştirilen meta-sentez araştırması, bir dizi etkili stratejinin varlığını ortaya koymaktadır. Bunlar; kültüre duyarlı öğretim, dil desteği, akran desteği ve işbirliğine dayalı öğrenme, farklılaştırılmış öğretim, ebeveyn katılımı ve aile desteği, mesleki gelişim ve öğretmen eğitimidir. Bu araştırma, göçmen öğrencilerin matematik öğrenme deneyimlerini geliştirmek için bu stratejileri ve müdahaleleri uygulamak için

eğitimcilerin ve politika yapıcıların birlikte çalışmasını önermektedir. Araştırmanın sınırlılıkları, incelenen literatürdeki potansiyel önyargıları ve bulguların genellenebilirliğini içermektedir. Bu araştırma, göçmen öğrenciler arasındaki matematik öğrenme güçlüklerine ilişkin mevcut bilgilere katkıda bulunurken, bu alanda araştırmaların devam ettirilmesi ihtiyacının da altını çizmektedir.

Anahtar Kelimeler: matematik öğrenimi, göçmen öğrenciler, öğrenme güçlükleri, dil engelleri, kültürel farklılıklar, sosyoekonomik faktörler

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CHAPTER 1 - INTRODUCTION

1.1. Research Background

People are increasingly mobile across international borders in today's increasingly globalized society. Because of the increasing number of immigrants, classrooms around the world are seeing a level of cultural, linguistic and ethnic variety that has never been seen before (Symons & Ponzio, 2019). Educators, who are working to ensure that all kids, especially immigrant children, have access to a high-quality education, face new problems and opportunities as a result of this diversity.

The discipline of mathematics holds a crucial position in primary education, serving as a cornerstone for advanced knowledge acquisition and exerting a substantial influence on the academic and vocational trajectories of students (Abd Algani & Eshan, 2022). Studies have demonstrated that immigrant pupils frequently face challenges in comprehending mathematical concepts, resulting in decreased academic performance, heightened rates of discontinuation and limited prospects for societal and economic assimilation (Han, 2016; Karakus et al., 2022). Comprehending the variables that contribute to these challenges and discovering efficacious tactics to mitigate them is imperative in advancing the academic achievement of immigrant pupils and cultivating communal harmony in heterogeneous communities.

Language barriers are a major cause of mathematics learning difficulties for immigrant students (Dolapcioglu & Bolat, 2021; Triventi et al., 2022). The inability to understand mathematical principles and problem-solving procedures is compounded for many immigrant students who are not fluent in the language of instruction (Triventi et al., 2022). Students with language barriers may also struggle with mathematics because the subject has its own unique lexicon and symbolic notation (Moschkovich, 2012). The ability to engage in mathematical discourse, such as explaining reasoning, defending solutions and comprehending word problems, is also an important part of the role of language in mathematics learning (Carcoba Falomir, 2022). Without the requisite language abilities, immigrant students may find it difficult to take part in these discursive practices, which might hinder their capacity to acquire both conceptual and procedural fluency in mathematics (Prediger et al., 2019).

The learning experiences of immigrant students in mathematics classrooms are significantly influenced by cultural factors (Haim & Tannenbaum, 2022; Ndijuye, 2022). The manner in which mathematical concepts are approached, problem-solving strategies and learning styles vary across cultures. These differences may not always be consistent with the predominant practices in the educational system of the host country. Some societies may place greater emphasis on cooperative learning and whole system solutions, whereas others may prioritize solitary efforts and analytical thinking (Lahann & Lambdin, 2020). Furthermore, it is possible for immigrant pupils to experience cultural disparities between their domestic and educational settings, which may have an effect on their drive, involvement and self-concept development in the process of acquiring mathematical knowledge (Aguirre & Bunch, 2012). As an illustration, individuals may perceive mathematics as a subject that lacks relevance to their daily lives and cultural customs or experience marginalization due to the prevailing cultural standards and anticipations in the classroom (Gutiérrez, 2013). According to Civil (2020), cultural elements have the potential to intensify the challenges encountered by immigrant pupils in their learning process and sustain disparities in their mathematical education outcomes.

Learning difficulties in different subjects including mathematics among immigrant students may also be influenced by socioeconomic variables (Ferri et al., 2023; Zhong, 2022). The low socioeconomic status of many immigrant families limits their ability to provide their children with adequate educational opportunities (Teltemann et al., 2022). Another barrier to immigrant parents' capacity to assist their children in succeeding in school is their own lack of familiarity with the local educational system and standards (Free & Križ, 2022). Math anxiety and negative attitudes toward mathematics are more common in students from lower socioeconomic backgrounds and this contributes to their already lower arithmetic ability (Sirin, 2005; Yuan et al., 2023). The cumulative consequences of socioeconomic hardship may cause a vicious cycle of underachievement and disengagement in mathematics learning for immigrant pupils (Han, 2016).

The good relationships between teachers and students besides to the classroom procedures can also affect how well immigrant students learn mathematics (Ferri et al., 2023; He, 2023). Teachers are a very important part of creating a welcoming and

supportive learning environment in which all students, no matter their race, language, or socioeconomic background, feel like they are valued and honored (Goldman & Peluso, 2022). But some teachers may not have the cultural knowledge and teaching skills they need to meet the different needs of their immigrant students. This can make them have lower standards for their students and use stereotypes and biases in the way they teach (Aguirre & Bunch, 2012). Some teachers may lack the essential cultural competence and pedagogical skills to effectively address the diverse needs of immigrant students. In addition, research has indicated that immigrant students may benefit from instructional approaches that build on their cultural and language resources (Civil, 2016). These instructional approaches include things like integrating real-life contexts, using different representations and supporting collaborative problem-solving. On the other hand, it is possible that these methods will fail to catch on in mainstream mathematics classes due to restrictions on the curriculum, the pressures of standardized testing, or the attitudes that instructors have about what constitutes effective mathematics instruction (Gutiérrez, 2013).

The mathematics learning outcomes of immigrant students can be influenced by parental involvement (Khilji & Xenofontos, 2023; Kirksey et al., 2022). Research has indicated that the engagement of parents in their children's education, including activities such as assisting with homework, attending school-related gatherings and establishing elevated academic standards, is correlated with favorable outcomes in terms of academic accomplishment and drive (Parmar & Nathans, 2022; Şengönül, 2022). Immigrant parents may encounter several obstacles to their participation, including linguistic challenges, limited availability, or lack of familiarity with the educational framework of the destination nation (Rabin, 2020). Furthermore, immigrant parents may hold different beliefs and expectations about their roles in their children's education, which can influence the types and levels of involvement they engage in (González et al., 2005). For instance, some immigrant parents may prioritize moral and social development over academic achievement or may rely on the school and teachers to provide educational support for their children (Gönültaş & Mulvey, 2019). These differences in parental involvement can contribute to the mathematics learning difficulties faced by immigrant students in primary school.

Mathematics learning difficulties among immigrant students in primary school are a multifaceted issue that involves a complex interplay of language barriers, cultural differences, socioeconomic challenges, psychological factors and educational background and prior knowledge. Addressing these challenges requires a comprehensive approach that acknowledges the diverse needs, strengths and experiences of immigrant students and promotes equitable access to high-quality mathematics education for all students.

1.2. Problem Statement

The children of immigrants and refugees who move to new places with different language and different cultures have more possibility to encounter problems in learning (Ferri et al., 2023; Khilji & Xenofontos, 2023; Koehler & Schneider, 2019). Immigrant children can have unique learning issues in primary school, despite their superiority in some of them (Demintseva, 2020). Graham et al. (2016) found that the source of primary students learning difficulties likely caused by parents' misunderstanding of the new system of education, educators' stereotypes, discrimination and harassment. However, other scholars claimed that parental participation, family interconnection and educator knowledge of languages and cultural tradition may help refugee children achieve the desired success (Soylu et al., 2020).

In specific, students of mathematics who are studying in different language face problems in specialized vocabulary and discourse features of mathematics (Barwell, 2020; Prediger et al., 2019; Varughese, 2009). Previous studies revealed that the weak student performance in mathematics is caused by the fundamental mathematical difficulties but increased when considering the language obstacles as well (Nyirmafaranga A, 2014 ; Planas et al., 2018).

In addition, students in the primary schools have different learning abilities due to the different culture or different background and the teachers must have the ability to use different methods and approaches to deal with this matter (Alhassan & Abosi, 2014; Boaler, 2002). Students' abilities to learn could be different from one subject to another and may have nothing to do with intelligence and are distinct from intellectual disabilities (Copeland & Griffin, 2021; Woodcock et al., 2019). The weak learning abilities is a result of sensory impairments, developmental delays, or societal,

economic, or environmental disadvantages (Kunwar et al., 2021). If the teachers developed different adapted teaching approaches, students' ability can be improved and they can find their specific way to overcome these difficulties and interventions can be a significant help (Kunwar et al., 2021; Woodcock et al., 2019).

Previous studies revealed that one in 10 refugee children has some form of learning difficulties (Cerna, 2019; Graham et al., 2016). Refugee children may suffer from intellectual deficiencies and problems in behaviour, attention, social interaction, autism or vision and hearing (Demintseva, 2020; Graham et al., 2016). As a refugee child, going to school is a big step, always associated with learning another language and adapting to new systems, expectations and cultures (Koehler & Schneider, 2019; Soylu et al., 2020). In this case, teachers may not notice the learning difficulties early enough to be able to provide appropriate support (Graham et al., 2016). Studies have been limited to examine the association between autism, language impairments, or brain disorders and reading or math difficulties (Graham et al., 2016; Koehler & Schneider, 2019).

Despite the numerous efforts made by schools and educational systems, immigrant students in primary school continue to struggle with mathematics learning, particularly in their early years. While mathematics learning difficulties are common for all students, immigrant students experience additional challenges related to language barriers, cultural differences and socioeconomic factors. The purpose of this research is to synthesize the mathematics learning difficulties reported in the literature that immigrant students face in mathematics learning and to identify effective strategies that can be used to support their learning. By using meta-synthesis of the reported literature, this study aims to enhance primary school mathematics learning outcomes for immigrant students by analysing the issues that lead to mathematics learning difficulties among immigrant students and providing insights and recommendations for educators and policymakers.

1.3. Purpose of the Research

The purpose of this study is to analyse the mathematics learning difficulties reported in the literature that immigrant students have in mathematics learning while they are enrolled in primary school and to find effective strategies that may be

employed to promote the students' academic growth by synthesizing the reported literature. Some of these issues include language barriers, cultural differences and socioeconomic concerns. Through achieving this goal, the study hopes to provide insights and recommendations for educators and policymakers to improve the mathematics learning outcomes of immigrant students while they are enrolled in primary school.

1.4. Research Questions

The research questions of the present study are the followings:

1. What are the mathematics learning difficulties reported in the literature that immigrant students face in mathematics learning in primary school?
2. What are the reasons of the identified mathematics learning difficulties among immigrant students, based on the reported literature?
3. Which strategies and interventions have been proven effective in addressing the mathematics learning difficulties faced by immigrant students in primary school, based on the reported literature?
4. How can educators, policymakers and researchers collaborate to better support immigrant students in overcoming mathematics learning difficulties, based on the reported literature?

1.5. Research Objectives

To achieve the proposed research purpose, the following objectives will be addressed:

1. To identify the mathematics learning difficulties that immigrant students face in mathematics learning, based on the reported literature.
2. To explore the reasons of these mathematics learning difficulties, such as language barriers, cultural differences and socioeconomic challenges, based on the reported literature.
3. To examine the effectiveness of various strategies and interventions designed to support immigrant students in overcoming these mathematics learning difficulties, based on the reported literature.

4. To provide recommendations for educators, policymakers and researchers on how to enhance mathematics learning experiences for immigrant students in primary school, based on the reported literature.

1.6. Limitations of the Study

The study has some limitations that scopes the study and make it different from other studies, which is based on the concepts and methods, as the following:

- ✓ The study concentrated on immigrant students in primary schools and their difficulties with mathematics learning. The study assessed the current literature, including academic journals, books and reports, relating to immigrant students' mathematics learning difficulties.
- ✓ To ensure that the evaluation contains the most recent information possible, the analysis encompassed the years 2010 through 2023 (Current).
- ✓ The study did not focus on other parts of the educational challenges faced by immigrant students, such as reading or writing difficulties; rather, it will concentrate only on mathematics learning difficulties.

1.7. Originality of the Study

This research has some original works which will be marked to this particular study and include the following:

- ✓ The study gives an in-depth look at the literature on primary school immigrant students' mathematics learning difficulties. The literature review's meta-synthesis brings together the results of multiple studies and makes it possible to find similar themes and trends.
- ✓ Insights into the link between these factors and mathematics learning difficulties are provided by the research, which identifies the factors that contribute to mathematics learning difficulties among immigrant students, such as language barriers, cultural differences and socioeconomic factors.
- ✓ The study identifies effective strategies and interventions that have been successful in assisting immigrant students' mathematics learning in primary

school and makes suggestions for teachers and policymakers to improve mathematics learning outcomes.

- ✓ By providing a complete synthesis of existing research and identifying effective strategies and interventions for supporting their mathematics learning, the research fills a gap in the literature on mathematics learning difficulties among immigrant students.
- ✓ The study emphasizes the significance of comprehending the particular difficulties immigrant students face in mathematics learning and the necessity of individualized interventions and assistance to enhance their mathematics learning outcomes.
- ✓ The literature review's meta-synthesis is a rigorous and structured way to put together the research that has already been done and it lays the groundwork for future research in this area.

1.8. Expected Impact

The findings of the study will hopefully have contributions to the knowledge, research and the practitioners. For knowledge, the study aims to enhance comprehension of the challenges encountered by immigrant pupils in primary education with regards to their acquisition of mathematical skills. Second, the study aims to gain a deeper understanding of the various elements that contribute to challenges in mathematics learning among immigrant pupils, including but not limited to linguistic obstacles, cultural disparities and socioeconomic circumstances. Third, the study aims to ascertain efficacious approaches and measures that have demonstrated success in facilitating the acquisition of mathematical skills among primary school immigrant pupils.

For academics, the study aims to conduct a thorough examination of the current body of literature pertaining to challenges in mathematics learning experienced by immigrant pupils at the primary school level. Second, the study aims to make a scholarly contribution to the advancement of knowledge and understanding of mathematics learning challenges experienced by immigrant students through the development of theory and research. Third, the study will establish a basis for

subsequent analysing into challenges encountered by immigrant students in comprehending mathematics.

For practitioners, the study aims to offer valuable perspectives and suggestions to educators and policymakers, with the objective of enhancing the mathematical achievement of immigrant pupils in primary education. Second, the study aims to ascertain efficacious approaches and measures that can be employed to facilitate the acquisition of mathematical skills among primary school immigrant pupils. Third, the study aims to establish a foundation for designing customized interventions and assistance for immigrant pupils in the domain of mathematics education.

In general, the anticipated conclusions of the research will be advantageous to academics, educators, policymakers and practitioners in the field of practice when it comes to resolving the mathematics learning difficulties experienced by immigrant students while they are enrolled in primary school.

1.9. Thesis Structure

The proposed study entitled "Mathematics Learning Difficulties Among Immigrant Primary School Students: A Meta-Synthesis Study" will employ a systematic literature review approach and meta-synthesis methodology. The research will involve a series of steps or research flow that will be aligned with the five chapters of the study.

Chapter 1 – the first chapter present chapter that serves as an introductory section to the topic at hand. Its purpose is to provide a brief overview of the subject matter and to establish the context for the subsequent discussion. The present chapter aims to furnish the contextual information of the research background, problem, goals, extent, importance and constraints of the research. The first step is to recognize and specify the research issue, followed by the development of research questions and aims. An extensive literature review and the theoretical underpinnings that will serve as the study's compass will be presented in the introduction.

Chapter 2 – The second chapter provides a thorough literature review of the research that went into this study. In the following chapter, the content includes a

comprehensive review of the relevant literature. Data from a wide range of sources, such as but not limited to books, journals, articles and internet databases, will need to be gathered and analysed in order to conduct a literature review. Finding research gaps and assessing the quality of previously conducted studies are the primary objectives of a literature review.

Chapter 3 – The study's methodology—research plan, data collecting, analysis and sample selection—is covered in the third chapter. Methods such as meta-synthesis and systematic literature review was used in this study. The proposed technique begins with the selection and retrieval of relevant literature, continues with a screening based on inclusion and exclusion criteria and concludes with a comprehensive analysis of the collected data. The strategy for data analysis will make use of both descriptive and inferential statistics.

Chapter 4 – The findings and analysis of the data collected are presented in chapter four of this study. The results have been carefully analysed and discussed to provide a full picture of the study. In what follows, we'll discuss the findings of the literature review meta-synthesis and how we arrived at those findings. A variety of tables, graphs and charts will be used to display the findings. Finding the most salient trends and themes in the data is a key part of any data analysis process. Implications for practice and theory will be discussed in further depth below.

Chapter 5 – The findings and recommendations of the study are presented in the fifth chapter. The conclusion provides a synopsis of the report as well as any conclusions that may be drawn from it. The conclusions of the study served as the basis for the recommendations. This chapter presents a summary of the research findings, including their possible impacts and any limitations imposed by the study. This chapter will provide a glimpse into forthcoming research, policy and practice. The conclusion will be based on the aims of the research as well as the findings. In the chapter's conclusion, an analysis of the significance of the research and its addition to the literature will be presented.

CHAPTER 2 - LITERATURE REVIEW

2.1. Introduction

The study is synthesizing the existing literature review to explore the mathematics learning difficulties learning among the immigrant students in primary school. Therefore, the chapter include illustrations and discussions for different related topics such as second language and learning, besides to discussion of different mathematics learning difficulties and challenges.

2.2. Second Language Acquisition and Students Learning

Children who are refugees require linguistic assistance so they can interact with those around, learn the local tongue and have a sense of belonging. Thus, the use of language may either help or impede their assimilation (Cerna, 2019; Ferri et al., 2023). Children who have fled their nation frequently place great priority on learning the language to succeed in their new environment (Cerna, 2019). However, there may be large differences in linguistic ability across several dimensions. Children may be proficient in spoken and colloquial language, but the opposite when it comes to language in an academic context (Cummins, 2021). This was clarified by Bernard (2020), who argued that "cognitive / academic language proficiency" (CALP) and basic interpersonal communication skills (BICS) are fundamentally complex skills. According to him, BICS contains abilities that are necessary for ordinary communication, including as pronunciation, rudimentary vocabulary and grammar. Moreover, in around two years following their early introduction to a second language, the majority of refugee students may gain these abilities quickly. Further, students must learn abilities including comparing, categorizing, synthesizing, assessing and inferring in addition to language throughout the development of academic competency. As a result, it takes learners who are learning a second language at least 5 years to establish the "CALP". Language proficiency is crucial for pupils with refugee or immigrant origins to feel like they belong at school as well as for academic achievement (Cerna, 2019). To aid in the development of their sense of self, it could be beneficial to

encourage refugee kids to voice their thoughts and engage in class discussions (Mosselson, 2006).

The language issue is a barrier in the efforts to integrate refugee kids into schools and communities. Helping the immigrant or refugee students in creating and reconstructing their identities contribute to their performance (Guo-Brennan & Guo-Brennan, 2020, 2021). Schools are locations for socializing; thus, it is their duty to assist refugee pupils in assimilating into their new environment (Borsch et al., 2021; Hogue, 2018; Sheikh & Anderson, 2018). As it can be challenging for refugee students to adjust if they are unable to find the balance between their own culture and the culture of the new country they are living in (Nakeyar et al., 2018). Hence, it is crucial to help the students find this balance to aid them in adapting and learning (Kaprielian-Churchill, 1996).

2.3. Learning Challenges of Immigrant Students

Refugee kids' and their families' ambitions for educational possibilities in their new countries are frequently very high (Isik-Ercan, 2012; Luster et al., 2010). Yet, post-migration circumstances can provide difficulties for those children's learning. These conditions include learning a brand-new language and needing to adjust and navigate new culture and learning environments (Brenner & Kia-Keating, 2016; Matthews, 2008). Furthermore, the lives of these children are undoubtedly affected by the health, economic and housing challenges that refugee families frequently face following relocation (Block et al., 2014).

One of the recent examples of the immigrant students is the Syrian children who have several academic difficulties in their host countries, according to the UNHCR (2016), which reported on the educational obstacles facing them. These represent the dropout rate in schools as well as the language barrier, as kids occasionally struggle to speak the local Arab dialect. These kids are currently having trouble learning either French or English, with the former proving to be more difficult. The second issue is that people regard schools as terrifying places where bullying may flourish. The fact that refugee teachers are not adequately trained to provide classroom protection and lessen the trauma experienced by refugee children makes the problem worse. The third issue is to resources, when refugees lack the funds to pay for supplies, tuition and

commuting. Consequently, to ease their families' financial distress, the refugee children will be compelled to look for employment. The fourth problem appears to be that there are many organizations and institutions prepared to assist, but their efforts are hampered by top-down solutions and the duplication of their duties. The final issue, in the opinion of the aforementioned international organization, is the distinction between home education and that of the host nation.

Previous studies in the learning challenges that encountered by students of immigrants, refugees and new arrivals revealed that the language difficulties, culture difference and socio emotional problems are among the most causes of learning difficulties. For instance, Chwastek et al. (2022) conducted a study in Germany and claimed that the recently refugee children have weak academic learning skills compared to immigrants children, which is linked to motor skills. Şensin et al. (2019) conducted a study in Italy and claimed that the refugee and immigrant students in primary schools were adapted well to the new schooling system in Italy, but they still have language difficulties. Teachers stated that multicultural education training is needed, besides to the administrative support to implement new practices. In a study conducted in Denmark by Jensen and Rasmussen (2011), it was shown that immigrants' concentration in schools affects both native and immigrant children's academic performance especially in science and mathematics. The schools with high number of immigrants shows a lower academic performance.

The difficulties faced by schools in providing a high-quality education in these conditions are well known. According to Roy & Roxas (2011), many instructors feel unprepared and unqualified to address the social and academic requirements of refugee pupils. Particularly in rural and regional locations is this the case (Major et al., 2013). Additionally, by favouring written language over oral language, education continues to be based on unchallenged presumptions of a formal, literacy-immersed print learner (Wilkinson et al., 2017; Woods, 2009). Schools may also overlook other abilities, skills and subjugated information that refugee kids offer to the classroom (Wilkinson et al., 2017; Yosso, 2005). This may result in improper practices and unreasonable expectations (Baak et al., 2018, Pastoor, 2017). Refugee pupils who lack the tools and experiences necessary to succeed in an Australian public school may quickly encounter "fish out of water" syndrome (Bourdieu, 1986; Dumenden & English, 2013).

While the majority of the study emphasizes the difficulties associated with educating refugees, a small but increasing literature review shows that despite these difficulties, schools may become more welcoming to refugee students. According to Taylor & Sidhu (2012) and Pugh et al. (2012), inclusive education for refugee pupils requires a friendly and upbeat environment. According to Pugh et al. (2012), a respectful environment must permeate every aspect of the school, from indoor and outdoor settings to teaching and philosophy. It has been discovered that adopting culturally appropriate methods (Bitew & Ferguson, 2012), tailored programme (Naidoo, 2009) and immersing students in nurturing "everyday learning settings" (Wilkinson & Lloyd-Zantiotis, 2017) might be beneficial.

2.4. Second Language and Mathematics Learning difficulties

We use language as a vital skill to communicate our thoughts, feelings and inquiries to others around us. Making understanding of spoken language, word meaning and sound manipulation and retrieval are only a few examples (Barre et al., 2011). Additionally important for academic success are the skills of language, which include reading and math (Chow & Wehby, 2018). Word understanding substantially relies on phonological awareness, especially in the early years and reading ability is significantly impacted by vocabulary and oral understanding throughout a person's growth. Thus, this relationship between language and reading and mathematics is well established (Hjetland et al., 2019).

Further, the relationship between language and mathematics has especially been examined by several scholars (Chow & Jacobs, 2016; de Araujo et al., 2018; Koponen et al., 2017). English language learners' experiences learning mathematics in a multilingual educational context were the topic of a qualitative literature review by de Araujo et al. (2018). They contend that language serves as the major vehicle via which English language learners pick up mathematical information. Meaning, curricula that include a language factor and multimodal education, including visual presentations, can support English language learners' understanding of mathematics by making up for their inadequate English language ability. Additionally, they proposed that English language learners should study math while using their first language as it is simpler to employ mathematical reasoning in one's first language than in one's second (e.g., de

Araujo et al., 2018; Martin & Fuchs, 2019). Moreover, the relationship between oral language and fraction results among school-age adolescents was examined by Chow & Jacobs (2016) and revealed that spoken language is significantly related to fraction performance and that cognition may help to explain this relationship. Furthermore, Koponen et al. (2017) discovered a substantial association between RAN "one component of phonological processing that mainly taps verbal retrieval abilities" and mathematics, across 38 studies. These findings imply that the recovery of mathematical representations from long-term memory might partially account for the relationship between RAN and mathematics (Georgiou et al., 2020; Koponen et al., 2017).

The medium role of language in mathematics may vary depending on whether someone is studying a second language or utilizing their first language to learn and do math. Many studies have looked into how mathematics is learned and performed by English language learners (Barwell et al., 2018; Planas, 2018; Planas et al., 2018). The English language has a moderate impact on math learning and performance in English-language learners, according to a number of sociocultural theories used in this study. It implies that studying mathematics necessitates using vocabulary and grammar unique to mathematics (Pimm, 2019) and that English-language learners must be able to utilize English effectively to learn and apply mathematics-specific language (Schleppegrell, 2007). English language learners who translate the definitions of mathematical terms from their native tongue to English frequently perceive them incorrectly (Kazima, 2007). Additionally, English-language learners can utilize it to speak mathematics-specific language during math lessons more effectively (Moschkovich, 2012; Schleppegrell, 2007). All these data points to the possibility that second-language learners may have a special need for the medium role of language in mathematics.

Mathematics learning difficulties when taught in a second language, particularly for immigrants, have been studied in the past. It was shown that these issues had a major impact on math learning. Compared to the second generation of German-Turkish immigrants, new immigrants who originate from Arabic nations have difficult obstacles in German math classrooms, according to Krause et al. (2021). The findings showed that using multilingual resources in math classrooms can help immigrants integrate over time because they can use their subject-specific expertise to help others acquire the target language at a pre-academic level. According to a research by Millon-Fauré

(2019) that assessed the skills of 177 French migrant students, their poor math performance is not always related to their level of French proficiency and it is important to assess their individual requirements.

2.5. Discussion on Different Barriers in Mathematics Learning

Language acquisition and mathematical proficiency are interdependent and must be stressed. Language is crucial to mathematical communication. This helps students understand mathematical terminology, symbolic representations and mathematical discussions (Barwell, 2010). Language proficiency is a key to mathematical knowledge acquisition. Language is needed for mathematical concepts to propagate. To generate and explain mathematical reasoning, Moschkovich (2012) says students must understand mathematics' language components. Verbal explanations are utilised to convey mathematical concepts. Comprehension of mathematical language is a prerequisite for complete engagement in mathematical discourse and the acquisition of proficiency in advanced mathematical concepts. The decline of mathematical discourse and proficiency may ensue in the event that students fail to comprehend the language of mathematics. According to Prediger et al. (2015), the acquisition of mathematical knowledge necessitates competence in a secondary language. Mathematicians employ symbolic notation and precise terminology to depict numerical relationships and geometric shapes. A requisite skill for understanding symbolic representations, mathematical terminology and logical reasoning is fluency. Consequently, effective communication is a crucial factor in achieving success in mathematics. Barwell (2016) has suggested that inadequate language proficiency could pose a challenge for students in comprehending mathematical concepts and procedures. According to scholarly sources (Moschkovich, 2013; Civil & Planas, 2014), inadequate linguistic skills may impede an individual's capacity to grasp and apply mathematical principles. Acquiring mathematical knowledge requires more than mere manipulation of numerical values. Proficiency in language is a prerequisite for effectively resolving verbal problems, employing algorithms and validating accuracy.

The influence of culture on the pedagogical practises and acquisition of mathematical knowledge can be significant. The mathematical problem-solving approaches and comprehension of students may be impacted by their cultural backgrounds and experiences. Gutstein (2012) suggests that there may be additional

challenges for immigrant students in mathematics education due to a potential lack of alignment between their cultural backgrounds and the prevailing culture of the subject. The acquisition of mathematical knowledge is notably impacted by cultural differences, primarily due to the potential for cultural dissonance. The occurrence in question emerges when the cultural convictions and customs of the academic establishment or classroom are discordant with those of the student's indigenous culture (Gutstein, 2012). The divergence in viewpoints between educators and learners can manifest in various ways, encompassing contrasting presumptions regarding the role of the instructor, the fundamental nature of mathematical expertise, the process of knowledge acquisition and the norms of classroom discourse. In some cultures, educators hold the primary responsibility for imparting knowledge, while learners are expected to acquire knowledge in a passive manner. In contrast to certain educational contexts, Western pedagogical approaches prioritise active learning and student involvement, which may prove unfamiliar and uncomfortable for students hailing from diverse cultural backgrounds. In addition, it is noteworthy that cultural disparities may impact the manner in which students comprehend mathematical problems and approach the process of resolving them. According to Presmeg (2011), the cultural experiences of immigrant students may have influenced their ways of thinking, reasoning and problem-solving, resulting in unique perspectives. Notwithstanding, these cognitive approaches may not be acknowledged or esteemed in the conventional mathematics learning environment, thereby posing challenges for these learners to participate in mathematical activities and articulate their comprehension. According to Turner et al. (2013), students' attitudes towards mathematics, self-efficacy beliefs and motivation to learn can be influenced by cultural differences. Cultural factors have the potential to shape students' perceptions of mathematics and its applicability to their daily lives. These factors may include societal attitudes towards mathematics, cultural beliefs regarding the significance of mathematics and cultural stereotypes concerning the capacity of individuals to Microsoft Excel in mathematics.

Several academic inquiries have explored the potential impact of students' socioeconomic backgrounds on their mathematical proficiency. The concept of "socioeconomic status" (SES) pertains to the economic and social position of an individual or family relative to the broader population. Several variables, such as financial status, educational attainment and occupational selection, exert an impact on

the phenomenon. According to Sirin's (2005) research, there exists a significant correlation between an individual's socioeconomic status and their level of academic achievement in mathematics. Studies conducted in the field of education often uncover discrepancies in mathematical proficiency. There exists a correlation between an individual's socioeconomic status and the aforementioned variations. According to the findings of Bradley and Corwyn's (2002) research, individuals who come from lower socioeconomic status backgrounds exhibit lower levels of mathematical proficiency compared to their more financially privileged counterparts. The correlation between socioeconomic status and mathematical proficiency can be elucidated by various factors. It is noteworthy to mention that individuals hailing from lower-income socioeconomic strata may encounter difficulties in obtaining access to a diverse array of educational resources. Study materials may encompass a variety of resources, such as books, laptops, internet access, private instruction and a conducive home atmosphere. According to Cheadle's (2008) research, this could potentially impede their ability to attain proficiency in mathematics and achieve success in the subject. The influence of students' socioeconomic status on the calibre of their education is noteworthy and warrants consideration. According to Aikens and Barbarin (2008), educational establishments situated in low socio-economic status regions encounter a higher number of obstacles, including but not limited to, increased class sizes, insufficiently skilled educators, inadequate resources and subpar facilities. A potential association could exist between the inequities prevalent in academic institutions and the insufficient provision of mathematical instruction, leading to suboptimal academic achievement among pupils. The correlation between low socioeconomic status and stress may have an adverse impact on students' academic achievement. Research has demonstrated that stress can impair cognitive performance, focus and emotional well-being. Evans' (2004) research indicates that individuals hailing from lower socioeconomic status backgrounds are more susceptible to encountering various stressors, including financial difficulties, familial discord and health-related issues. The presence of anxieties can impede the process of learning and pose a barrier to attaining academic success.

Boaler (2016) posits that students' acquisition of mathematical knowledge is significantly impacted by various psychological factors, such as cognitive processes, motivational beliefs, attitudes towards learning and emotional well-being. The

multifaceted and interconnected nature of psychological factors can give rise to a complex interplay that impacts a student's aptitude for learning and achieving proficiency in mathematics. The acquisition of mathematical knowledge is significantly influenced by the cognitive processes, such as working memory and attention. Mathematical tasks, in particular those that require arithmetic computations and problem-solving, place a significant emphasis on the need of working memory. According to DeStefano and LeFevre (2004), having the ability to concurrently store and modify many bits of information is a prerequisite for successfully completing these activities. The learning of mathematical knowledge may be significantly hampered for people who experience challenges with their working memory. The academic performance of students in mathematics is significantly influenced by motivational beliefs, including self-efficacy beliefs and intrinsic motivation. Self-efficacy refers to an individual's belief in their capacity to successfully complete a task or achieve a goal. In the context of education, it relates to a student's confidence in their ability to perform academically. Pajares and Miller (1995) have reported that individuals with a high level of self-efficacy in mathematics tend to display more perseverance in their problem-solving endeavours and manifest greater resilience in the face of difficult mathematical problems. According to Deci and Ryan's (2008) proposal, intrinsic motivation, denoting the innate desire to engage in an activity for its inherent worth, can yield advantageous outcomes for students' engagement, perseverance and scholastic achievement in the domain of mathematics. The dispositions demonstrated towards mathematics, encompassing the occurrence of mathematics anxiety, possess the capacity to considerably impact the scholastic accomplishments of individuals. The occurrence of mathematics anxiety, denoting the sensation of stress, unease, or dread that obstructs an individual's performance in mathematics, has been evidenced to yield unfavourable consequences on mathematics achievement and lead to the evasion of mathematics-associated duties and syllabi (Ashcraft, 2002).

An individual's educational background and prior knowledge have a substantial impact on their ability to learn mathematical concepts. Bransford, Brown and Cocking (2000) argue that a student's educational background provides a scaffolding for learning new material by making it easier for new ideas to be absorbed and integrated into the student's existing cognitive framework. Hiebert and Carpenter (1992) argue that students' prior knowledge significantly impacts their ability to learn and apply new

ideas, hone their problem-solving skills and develop their mathematical thinking. It is essential to consider a student's educational background and earlier contacts with mathematics in order to understand and predict the student's performance and learning development in mathematics. Some factors affect how we think about mathematics, how we approach mathematical problems and what we believe about mathematics, say Fennema and Franke (1992). A learner is more likely to have a positive attitude towards learning mathematics, higher levels of self-efficacy and a propensity to learn new mathematical concepts if they have previously experienced success in the subject. On the other hand, it is possible that unfavourable past encounters with mathematics may lead to the development of mathematics anxiety, reduced self-efficacy and a tendency to avoid tasks and subjects related to mathematics (Bandura, 1997).

2.6. Discussion on Different Challenges Faced by Immigrant Students

Cummins (2011) noted that language barriers often hinder immigrant students' mathematical skills. Understanding and analysis of mathematical terminology is a problem. Mathematics has a unique lexicon of precise terms and symbols with specific meanings (Moschkovich, 2012). 'Factor', 'Prime', 'Ratio' and 'Difference' have mathematical meanings that differ from their colloquial meanings. Immigrant students may struggle to understand such terminology, causing confusion. Word problems are also difficult for limited-language students. Barwell (2014) states that solving word problems requires deciphering linguistic information, converting the scenario into a mathematical framework, solving the problem and interpreting the solution. Inadequate language proficiency can impede students' progress at various stages, resulting in inaccurate problem-solving or low self-confidence. The syntax of mathematical language may be difficult for immigrant students. The syntax of mathematics is different from one's native language. Students may find it difficult to understand and form mathematical statements due to the variation in structure, according to Clarkson (2010). Students who are used to "a number multiplied by five" may be confused by "five times a number." In mathematics schools, abstract and decontextualized language is employed. Cummins (2011) notes that students used to concrete and context-dependent language may suffer. They may struggle to grasp complex mathematical concepts and sophisticated mathematical reasoning. Immigrant students who speak a second language may fail to adjust to mathematics classroom social dynamics.

Language is essential for classroom discussions, collaborative problem-solving and mathematical thinking, according to Planas and Civil (2017). Language-challenged students may feel alienated from social learning, which can hinder mathematical comprehension and involvement.

Cultural differences affect immigrant students' mathematics learning, presenting a number of challenges. Navigating the home-school divide is one of the biggest challenges (Aguirre et al., 2013). In Western classrooms, collaborative problem-solving and student-led inquiry may be unfamiliar to immigrant students used to teacher-directed learning. This discrepancy can confuse and disengage. Additionally, mathematical practises and representations vary by culture. Cultural practises and experiences affect how numerical and spatial concepts are understood and represented (Bishop, 2012). Some communities use counting systems, spatial arrangements, or measurement units that differ from Western mathematical conventions. Immigrant students may struggle to relate to the material being taught or express their mathematical understanding when these culturally ingrained practises and representations are not acknowledged in the mathematics classroom. Culturally influenced mathematics beliefs and attitudes pose another problem. Immigrant students may internalise cultural stereotypes that affect their self-efficacy and mathematics learning motivation (Solórzano, 2013). Students' confidence and aspirations in mathematics learning may be affected by prevailing societal narratives that portray mathematics as a field better suited to certain genders or ethnicities. Cultural differences can affect mathematics classroom communication and social interaction. Immigrant students may have different classroom norms for participating in discussions, asking questions and disagreeing (Turner et al., 2013). These differences can cause misunderstandings or feelings of exclusion, affecting students' mathematics participation and learning.

Immigrant students frequently experience special challenges that can hinder their mathematics learning as a result of socioeconomic factors. Immigrant students confront additional challenges, such as linguistic and cultural barriers, as they adapt to a new school system and society. To begin, the economic hardships of immigrant families might have a negative impact on the academic success of their children. This difficulty can be brought on by things like job insecurity, low pay and a lack of social networks

(Portes & Rubén, 2012). The cost of tutoring, mathematics textbooks and classroom space may be prohibitive for immigrant families. Second, low socioeconomic status origins are more common among immigrant students and these students tend to attend schools with fewer resources, which might negatively impact mathematics education. Disadvantages in mathematics education have been documented in schools where teachers, textbooks and technology are all out of date (Kao & Thompson, 2003). There is a possibility that a parent's educational background and level of language proficiency influence the degree to which they are able to assist their child in the area of mathematics learning. As a consequence of this, many immigrant parents, particularly those who come from homes with a lower socioeconomic status, find it difficult to assist their children with their mathematics homework, interact with their children's instructors, or advocate for their educational requirements (Turney & Kao, 2009).

Immigrant students face unique psychological challenges in mathematics learning. Cultural adaptation, language barriers and socioeconomic challenges can compound these issues. Stress and anxiety are significant psychological challenges. Pressure to succeed, difficulty adjusting to a new educational system and potential discrimination or isolation can cause stress (Sirin, Ryce, Gupta, & Rogers-Sirin, 2013). Stress can impair working memory, attention and cognitive function, making mathematics learning difficult (Suárez-Orozco, Pimentel, & Martin, 2009). Many immigrant students experience mathematics anxiety due to language barriers or different math teaching methods in their home country (Haase & Lüdtke, 2018). This anxiety can create a negative feedback loop where fear of mathematics impairs performance, causing more anxiety. Due to language barriers or unfamiliarity with the curriculum or teaching methods, immigrant students may have lower mathematics self-efficacy (Lee, 2014). Lack of confidence can lower motivation, engagement and mathematics performance. Students may also experience stereotype threat, in which they fear their actions will confirm negative racial or ethnic stereotypes. According to Spencer, Logel and Davies (2016), this threat can significantly affect immigrant students' mathematics performance. Finally, acculturation, separation from familiar environments and discrimination or exclusion may strain immigrant students' emotional well-being. Emotional stress can impair cognitive processes and academic performance, including mathematics learning (Suárez-Orozco et al., 2010).

Immigrant students' diverse educational background and prior knowledge often present significant challenges in mathematics learning. Educational systems, curriculum content, teaching methods and languages differ between their home countries and the host countries, causing these challenges. The difference between the students' native mathematics curriculum and their new school's is a major issue. Some immigrant students may have learned different mathematical concepts or problem-solving strategies that don't fit their new curriculum (Schmidt, Cogan, & Houang, 2011). Disparities in prior knowledge can make it hard for them to keep up with the new curriculum. Another issue is teaching methods in different countries. Immigrant students may have been taught mathematics differently than in their new school. Some countries value conceptual understanding over procedural knowledge. These teaching methods can affect students' mathematical performance and make it hard for them to adjust to the new learning environment (Stigler & Hiebert, 1999). These challenges may be exacerbated by language barriers. If students learned mathematics in their first language in their home country, they may struggle to learn it in a second language in the new country (Moschkovich, 2012). Last but not least, immigrant students may experience stress during the adjustment to a new educational system, which may affect their motivation and interest in mathematics learning. If they feel they are behind their peers due to educational backgrounds, students may feel anxious or insecure (Suárez-Orozco, Pimentel, & Martin, 2009).

2.7. Discussion on Different Strategies for Overcoming the Language Proficiency Challenges

Diverse solutions can be used to overcome the linguistic barriers immigrant students have when learning mathematical knowledge. According to Moschkovich (2012), mathematics education requires explicit language training. The pedagogical approach combines explicit instruction in mathematical vocabulary, syntax and discourse with real-world opportunities for students to use it. Teachers can include language objectives into mathematics instruction, teach essential mathematical vocabulary and encourage students to use it in writing and speech. Visual aids and manipulatives help immigrant students' mathematical literacy, according to Chapin and O'Connor (2013). Diagrams, graphs and number lines can clarify abstract mathematical concepts. Manipulatives can demonstrate mathematical concepts. This strategy may

help limited-language students interact with course content more quickly, reducing their reliance on oral communication. According to Barwell (2016), contextualising mathematical topics helps immigrant students understand them. This involves linking mathematical concepts to real-world situations that students can understand. Concrete examples can improve mathematical understanding and application. Familiar situations help solve word issues. Planas and Civil (2017) say collaborative learning can help immigrant students learn maths. Collaborative problem-solving in mathematics education encourages student participation in mathematical discourse and knowledge development through peer interaction. This strategy may improve students' mathematical, verbal and logical skills and promote social inclusion. According to Aguirre et al. (2013), culturally responsive teaching helps immigrant students learn maths. The technique involves understanding and incorporating students' cultural origins into the teaching methodology and recognising how their cultural experiences may affect their mathematical ability.

Immigrant students confront numerous challenges due to cultural differences in mathematics learning. As a first step, culturally responsive education might serve as a bridge between the student's home and school environments (Gay, 2010). Students' cultural experiences and background are valued and incorporated into the teaching and learning process in this method. Teachers can establish a classroom that appreciates cultural diversity by incorporating culturally relevant examples and problems into mathematics classes, drawing on students' cultural practises and experiences while discussing mathematical ideas. Second, it's possible for educators to take use of students' varying cultural perspectives on mathematics (Aguirre et al., 2013). Students' cultural mathematical practises, representations and problem-solving skills should be acknowledged and valued and they should be encouraged to employ them in their math work. Teachers can assist immigrant students in seeing how their cultural backgrounds are compatible with successful mathematics learning by doing this. Finally, addressing negative cultural beliefs about mathematics is an effective way to boost immigrant students' motivation and confidence in the subject (Solórzano, 2013). Teachers can encourage and assist students of different cultural backgrounds by highlighting the accomplishments of mathematicians from a wide range of backgrounds, thereby challenging social stereotypes about who can achieve in mathematics.

Educators and policymakers must develop and implement effective strategies to support immigrant students in mathematics learning due to their socioeconomic challenges. Tutoring or after-school mathematics programmes can help immigrant students succeed academically. These supports can reinforce classroom learning, provide practise and address individual learning needs (Reardon & Portilla, 2016). Next, schools can partner with community organisations to provide textbooks, technology and educational materials to low socioeconomic status of immigrant families. Food, healthcare and housing assistance can also help students succeed academically (Kieffer & Parker, 2016). School programmes can also encourage parental involvement. Parent education programmes could help parents understand the school system and how to support their children's learning at home with limited resources (Jeynes, 2012). To improve parent-teacher communication with immigrant parents, schools could provide translation services. Professional development helps teachers support low socioeconomic status immigrant students. This may include training on culturally responsive teaching, trauma-informed practises and engaging with families from diverse socioeconomic backgrounds (Paige & Smith, 2020).

To help immigrant students overcome psychological challenges in mathematics learning, strategies must promote emotional well-being, positive attitudes towards maths and self-efficacy. School-based mental health services can help students with stress, anxiety and other emotional issues (Sirin et al., 2013). These services can help students cope with immigration and acculturation stress, improving cognitive function and academic performance. Students who struggle with mathematics can get support. One-on-one tutoring, small group instruction and individualised feedback can help students understand and feel confident in mathematics (Haase & Lüdtke, 2018). To boost self-efficacy, teachers can give students maths success. Scaffolded instruction and cooperative learning strategies allow students to learn from each other and realise their potential (Lee, 2014). Creating a welcoming, diverse and anti-stereotype classroom is another important strategy (Spencer et al., 2016). Educators have the ability to instruct on multicultural subject matter, foster constructive exchanges among pupils from diverse backgrounds and confront detrimental stereotypes. The establishment of robust relationships between teachers, students and families can potentially contribute to the academic and psychological success of immigrant students. According to Suárez-Orozco et al. (2010), consistent communication between teachers

and families can facilitate parental support for their children's mathematics education at home. Additionally, robust teacher-student relationships can foster a sense of security and inclusion among students in the school setting.

Educators and institutions can use several methods to help immigrant students overcome the challenges of educational background and prior knowledge. These strategies build on students' prior knowledge, bridge understanding gaps and create an inclusive learning environment. The first step for schools is to assess immigrant students' prior knowledge upon arrival (Pitoniak & Royer, 2001). Assessments should be culturally sensitive and consider students' language proficiency. Teachers can design instruction to fill knowledge gaps after this evaluation. Second, educators can use bridging activities to help students connect their prior mathematical knowledge to the new curriculum (Nasir, Hand, & Taylor, 2008). Analogies, visual aids and real-world applications help students understand new mathematical concepts. Multicultural mathematics education also embraces students' diverse cultural backgrounds and incorporates culturally relevant content into mathematics (Greer, Mukhopadhyay, Powell, & Nelson-Barber, 2009). The implementation of this approach has the potential to enhance students' comprehension and engagement in the realm of mathematics education through the establishment of links between mathematical concepts and their cultural customs and personal encounters. According to Moschkovich (2012), language support in mathematics classes, including visual aids, simplified language and mathematical vocabulary, can prove advantageous for immigrant students. Peer tutoring is an additional academic support strategy that can be utilised to assist immigrant students. According to Topping and Ehly (2001), immigrant students have the opportunity to acquire problem-solving skills and familiarise themselves with the curriculum through interactions with their peers. Incorporating parental involvement in the education of students can yield advantageous outcomes. According to Hill and Tyson (2009), it is possible for parents to facilitate their children's mathematical learning at home by placing emphasis on the significance of education and establishing elevated academic standards.

2.8. Summary

The current chapter dug into the convergence of the learning of a second language and mathematics education, with a special emphasis on the challenges that are faced by immigrant students and the steps that can be taken to facilitate their study. Language barriers, differences in cultural norms, socioeconomic disparities, psychological concerns and gaps in educational experience and previous understanding have been recognised as the primary challenges that need to be overcome. It was determined that effective techniques include strategies such as language help, culturally relevant education, socioemotional support and bridging gaps in the curriculum. Insights into how different factors affect immigrant students' mathematics learning were gained from the synthesis of the relevant literature. Additionally, it provided light on the collaborative efforts that educators, policymakers and researchers might undertake in order to improve the educational experiences of these students.

CHAPTER 3 - METHODOLOGY

3.1. Introduction

This chapter specifically focuses on the research methodology used in this study. This chapter describes the research techniques used throughout this research. Meta-synthesis of literature review is used in this study as one of the qualitative approaches. In addition to that, research design and the analytic technique, is covered in this chapter.

3.2. Research Steps

Scientific research involves a systematic and structured approach to answering research questions or solving problems. In the case of the research "Mathematics Learning Difficulties Among Immigrant Primary School Students: A Meta-Synthesis Study" using systematic literature review strategy and meta-synthesis technique, the scientific systematic can include different step from defining the problem till acquiring results from the qualitative sources based on pattern recognition (Leary & Walker, 2018). A typical process for meta-synthesis research includes the following steps.

1. Define the research question and objectives: Clearly state the research question and objectives to guide the study and focus on the mathematics learning difficulties faced by immigrant students in primary school mathematics.
2. Develop a systematic search strategy: Identify relevant keywords and search electronic databases to find articles that address the research question.
3. Establish inclusion and exclusion criteria: Set specific criteria to determine which studies should be included in the review to maintain relevance and focus.
4. Screen and select studies: Assess articles based on their titles, abstracts and full texts to select the most relevant and high-quality studies for inclusion.
5. Extract and code relevant data: Use a systematic data extraction form and thematic analysis to organize and analyse the findings from the selected studies.
6. Synthesize and interpret the findings: Integrate the identified themes to provide a comprehensive understanding of the mathematics learning difficulties experienced by immigrant students.

7. Evaluate the quality and rigor of the included studies: Assess the methodological quality of the selected studies using a standardized tool to ensure the validity of the findings.
8. Report the findings and draw conclusions: Present the meta-synthesis results, discussing the main themes, limitations and recommendations for future research and educational practice.
9. Disseminate the findings: Share the results with relevant stakeholders through various channels to raise awareness and inform strategies to address the challenges faced by immigrant students in mathematics learning.

Overall, following these scientific systematic steps is crucial to ensure the rigor and validity of the research and to produce reliable and meaningful findings that can inform practice and policy in the field of mathematics learning difficulties among immigrant students in primary school.

3.3. Research Design

The aim of this study is to examine the mathematics learning difficulties reported in the literature that immigrant students face in mathematics learning in primary school and to identify effective strategies that can be used to support their learning. Overall, the study is qualitative research but in specific the following methodological issues describes the research design.

3.3.1. Interpretivism philosophy

Interpretivism is a philosophical approach to research that emphasizes the importance of understanding the subjective experiences and meanings of individuals within their social and cultural contexts (Bryman, 2016). As such, interpretivism is particularly relevant to research on mathematics learning difficulties among immigrant students, which is a complex and multifaceted phenomenon that is shaped by a variety of cultural and contextual factors. Meta-synthesis of literature reviews can benefit greatly from interpretivism because it can help shape the overall interpretation of the findings and guide the process of selecting and evaluating the studies that are incorporated into the analysis.

By stressing the role of context while selecting studies, interpretivism can be incorporated into the study design. An interpretivist approach would think about the cultural and contextual factors alongside the studies' relevance to the research topics. Language challenges, cultural perspectives regarding education and bias are all possible examples. Interpretivism can also be included into study design by stressing the significance of individual interpretation of results. Instead of focusing solely on hard numbers, an interpretivist approach would also consider the research participants' subjective experiences and interpretations. One approach would be to look at how educators and policymakers approach mathematics learning difficulties compared to how immigrant students and their families view and react to them.

3.3.2. Inductive Approach

When conducting research on complex and multifaceted phenomena like the difficulties immigrant students face in the classroom, the inductive method is an essential component of the research design. Beginning with a collection of observations is central to this method, followed by the construction of a theoretical framework to explain the phenomenon (Bryman, 2016). Typically, a researcher will begin a meta-synthesis of literature review analysis by picking a wide variety of articles that address the study issue. A grounded theory approach might then be used to identify recurrent patterns and themes throughout the accumulated literature. To do this, a theoretical framework that accounts for the results might be constructed using a codebook that classifies the studies according to key variables (Charmaz, 2014).

Further, the researcher's use of reflexivity may allow for a critical examination of their own assumptions about the difficulties immigrant students face in learning and how those assumptions may impact their interpretation of the research's findings (Gough, 2016). The researcher can get a deeper and more comprehensive understanding of the topic under study by employing an inductive methodology based on reflexivity and a grounded theory approach to analysis.

3.3.3. Qualitative Methods

In order to better understand complex events, such as the difficulties immigrant students face when studying mathematics, qualitative research methods are frequently used in the field of education. Exploring, identifying and evaluating relevant literature on a certain topic are all part of the qualitative research approach known as the systematic literature review (Grnmo, 2019).

The study " Mathematics Learning Difficulties Among Immigrant Primary School Students: A Meta-Synthesis Study" takes a meta-synthesis approach, which involves the systematic combination and interpretation of material from various qualitative studies, to explore this phenomenon. The goal of this method is to help you fully grasp a phenomenon by picking out its recurrent themes and patterns. Dinçer (2018) and L. A. Jensen and Allen (1996) both note that this approach can lead to surprising discoveries and a deeper comprehension of complex problems.

This study employed a systematic literature review methodology, which entails doing a search of the literature, finding applicable articles and reviewing them in order. The researcher chooses appropriate articles to include and exclude and then assesses the quality of the included studies against predetermined criteria (Grønmo, 2019; Hammarberg et al., 2016).

3.3.4. Systematic Literature Review Strategy

A literature review is an essential aspect of any research project with the overarching goal of learning what is already known about a given topic. Mathematics learning difficulties among immigrant students are a growing concern in primary schools and a systematic review of the literature in this area can reveal a lot of information on the nature of the problem, its origins and the strategies that have been used to address it. A systematic literature review is a powerful method for pinpointing gaps in our understanding of a certain topic. In turn, this can help with developing a research question and hypothesis that are grounded in the literature (Fink, 2019).

Literature review analysis, which involves a systematic and comprehensive examination of the relevant literature on a certain subject, is the focus of the present

research. Both empirical research studies and conceptual studies are included in the present research, each of which contributes important new information about the phenomenon under scrutiny. The analysis entails weighing the merits and shortcomings of the current literature and teasing out the overarching results and themes. A literature review analysis can give a general grasp of the components that contribute to the issue, such as language barriers, cultural differences and educational policies, in the context of the study on learning challenges among immigrant students. The analysis can also reveal successful strategies and interventions that have been used to address the issue, which can inform future research and policy suggestions.

3.3.5. Meta Synthesis of Literature Review

The current research makes use of the research strategy known as a meta-synthesis of literature review. When gathering, analysing and synthesising data from numerous qualitative studies, this method takes a methodical and systematic approach. The end result is a deep and nuanced comprehension of any phenomenon or topic you are studying (Cooper et al., 2019). This method seeks to evaluate and synthesise the data across research to uncover new insights, patterns and linkages, as opposed to simply summarising the existing literature. As it allows for the identification of shared patterns and distinctions across varied situations, meta-synthesis is useful when confronting complex issues or investigating the perspectives and interactions of disparate groups.

Incorporating a meta-synthesis into a literature review can help determine the consistency or disagreement of findings across studies and inspect what factors might influence the success of therapies (Finlayson & Dixon, 2008; L. A. Jensen & Allen, 1996). Recommendations for future study and practise can benefit from this. The current research makes use of the systematic and methodical meta-synthesis approach. This procedure entails the formulation of a research question, the creation of a systematic search strategy, the definition of inclusion and exclusion criteria, the screening and selection of pertinent studies, the extraction and coding of data, the synthesis and interpretation of findings, the assessment of the quality and rigour of the included studies, the reporting of the findings and the formulation of conclusions and the dissemination of the findings. Researchers can learn more about a topic than can be

gleaned from a single study by using the meta-synthesis method, which compiles evidence from numerous studies to form a more nuanced and all-encompassing whole

3.4. Meta Synthesis Design

The application of meta-synthesis methodology in this study is attributed to the qualitative nature of the antecedent research and the intricacy of the research problem, as previously expounded. The subsequent sections provide a thorough analysis of the procedure under three distinct subheadings.

3.4.1. Meta-Synthesis Plan

A comprehensive plan can be followed to conduct a meta-synthesis of literature review for the research titled "Mathematics Learning Difficulties Among Immigrant Primary School Students: A Meta-Synthesis Study"

1. Define the research question: The establishment of a clearly defined research question is essential in guiding the process of literature search. The present study aims to examine the prevalent challenges in mathematics learning encountered by primary school immigrant students. The research question that guides this study is: "What are the common mathematics learning difficulties experienced by immigrant students in primary school?"
2. Develop a systematic search strategy: Identifying relevant keywords and their combinations, such as "math learning," "immigrant students," "primary school," "learning difficulties," "challenges," and "barriers," to create a thorough search strategy.
3. Develop inclusion and exclusion criteria: Inclusion and exclusion criteria should be established to ensure that only relevant studies are included in the meta-synthesis. For example, inclusion criteria could be studies that report on mathematics learning difficulties experienced by immigrant students in primary school and were published in peer-reviewed journals within the past 10 years. Exclusion criteria could be studies that do not focus specifically on immigrant students or primary school students.

4. Conduct a comprehensive literature search: A systematic search of relevant databases, such as SCOPUS, ISI and ERIC, should be conducted using appropriate keywords and subject headings.
5. Screen and select studies: Screening the identified articles based on their titles and abstracts. If a study appears to meet the inclusion criteria, proceed to a full-text assessment. Two or more researchers should independently screen and select articles to minimize bias and enhance reliability.
6. Extract and code relevant data: Developing a data extraction form to systematically collect information from the selected studies, such as the study's purpose, sample, methodology, key findings and conclusions. Code the extracted data using a thematic analysis approach to identify and organize emergent themes related to the learning difficulties faced by immigrant students in mathematics.
7. Synthesize and interpret the findings: Conducting a meta-synthesis by analysing and integrating the identified themes across the selected studies. This process involves comparing and contrasting themes, identifying patterns and exploring relationships among the themes. The present study aims to offer a thorough comprehension of the challenges in learning mathematics faced by immigrant students in primary education.
8. Evaluate the quality and rigor of the included studies: Using a consistent metric to evaluate the research' level of methodological rigour and quality. The reliability of the research and the accuracy of the results can be assessed with the use of this kind of evaluation.
9. Report the findings and draw conclusions: Explaining the meta-analysis's findings clearly and systematically, focusing on the primary themes and subthemes that pertain to the mathematical learning challenges immigrant kids encounter. Moreover, recommendations for future research and educational practise based on the synthesised evidence should take into account the limitations of the included studies and the review itself (Booth, Sutton, & Papaioannou, 2016).
10. Disseminate the findings: Promoting the results of the meta-analysis to interested parties like teachers, policymakers and other academics in print and online venues such scholarly journals, conferences and social media. This will

provide strategies to aid immigrant students who are struggling with mathematics and bring more attention to their plight.

Overall, the meta-synthesis of literature review technique provides a thorough and reliable means of synthesising existing research on math learning challenges among primary school immigrant students. As a result, the researcher is better equipped to generalise their findings regarding the phenomenon and provide efficient solutions to these problems.

3.4.2. Justification for Choosing SCOPUS, ISI and ERIC Databases

The following justifies the use of SCOPUS, ISI (Web of Science) and ERIC as the primary databases for the study into math challenges experienced by primary school immigrant students:

1. Comprehensive coverage: Education, psychology and the social sciences are just few of the many fields that benefit from the comprehensive coverage of research articles, conference proceedings and other scholarly publications provided by SCOPUS, ISI (Web of Science) and ERIC. This guarantees that the search will pick up the vast majority of the relevant literature.
2. Multidisciplinary focus: The databases cover a wide range of academic disciplines, making it possible to find research on immigrant students' mathematics struggles in contexts as diverse as education, psychology, sociology and linguistics.
3. Advanced search capabilities: These databases have sophisticated search tools and filtering features that let you narrow your results by publication year, document type, language and topic.
4. Citation tracking: Both SCOPUS and ISI (Web of Science) have citation tracking and analysis tools that can help you find the most-cited papers and authors in your field. This helps you discover seminal works and understand the relationships between different studies.
5. Indexing quality: All three databases have rigorous indexing and abstracting standards, ensuring that the included publications are of high quality and relevance. This contributes to the reliability and validity of the search results.

6. Education-specific database: ERIC (Education Resources Information Centre) is a specialized database dedicated to education research and is sponsored by the U.S. Department of Education. By including ERIC in the search, you increase the chances of finding relevant and high-quality studies focused on education-related topics.

Using SCOPUS, ISI (Web of Science) and ERIC as the main databases for the study ensures comprehensive coverage of relevant literature, access to high-quality and multidisciplinary research and the use of advanced search and citation tracking features to aid in the identification and analysis of pertinent studies.

3.4.3. Keywords and Subject Headings

When searching for previous studies mathematics learning difficulties among immigrant students in primary school, consider using the following keywords and subject headings:

Keywords:

1. Mathematics learning
2. Math difficulties
3. Math achievement
4. Immigrant students
5. Elementary school
6. Primary school
7. Math education
8. Language barriers
9. Cultural barriers
10. Socioeconomic status
11. Acculturation
12. Language proficiency
13. Math anxiety
14. Parental involvement
15. Teacher-student relationship

Subject headings (using the Library of Congress Subject Headings or the Medical Subject Headings for databases like PubMed):

1. Mathematics – Study and teaching
2. Learning disabilities – Mathematics
3. Immigrants – Education
4. Primary school students – Education
5. Language and education
6. Cultural competence – Education
7. Academic achievement
8. Education, Primary
9. Mathematics anxiety

When searching databases, use a combination of these keywords and subject headings, linked with Boolean operators (AND, OR, NOT) to refine the search. For example:

- ("mathematics learning" OR "math education") AND ("immigrant students" OR "immigrants") AND ("elementary school" OR "primary school")
- ("math difficulties" OR "learning disabilities") AND ("language barriers" OR "cultural barriers") AND ("immigrant students" OR "immigrants")

Adjust the search strings based on the specific database and its search capabilities. Remember to also use truncation and wildcard symbols (e.g., * or ?) to capture different word forms or variations. For example:

- Math* AND (immigr* OR "foreign-born") AND (element* OR primary) AND (difficult* OR disabilit* OR barrier*)

CHAPTER 4 - FINDINGS AND DISCUSSION

4.1. Identifying the Number of Related articles

The number of academic publications found by using several criteria is summarised in Table 4.1. First, the articles' titles must include the words "immigrants" or "refugees;" second, they must include some reference to education; third, they must deal with primary school; and fourth, they must deal with mathematics.

When the search criteria included both 'Immigrants / Refugees' and 'Learning difficulties / problems / issues' in the title, a considerable number of 17000 articles were identified. This broad search implies that a vast amount of research has been done exploring the learning challenges faced by immigrant and refugee populations, albeit not specific to any grade level or subject.

Adding the criterion of 'Primary school' further refined the search, resulting in 8840 articles. This represents approximately 52% of the previous number, indicating a substantial interest in studying the difficulties faced specifically by primary school students from immigrant or refugee backgrounds.

The inclusion of 'Mathematics' in conjunction with 'Immigrants / Refugees' and 'Primary school' within the title resulted in a notable reduction in the quantity of articles, yielding a total of 1540. The statement implies a more specific and concentrated area of research pertaining to the acquisition of mathematical skills among immigrant pupils in the primary school level.

A total of 218 articles were obtained upon the convergence of the four criteria, namely 'Immigrants / Refugees', 'Learning difficulties / problems / issues', 'Primary school' and 'Mathematics'. The numerical value denotes the preeminent scholarly publications pertaining to the subject matter under examination, accentuating the obstacles encountered by immigrant pupils in primary educational institutions with regard to the acquisition of mathematical knowledge.

The aforementioned distribution highlights the significance of meticulously delineating the search parameters during the execution of a literature review. The text

sheds light on the present status of research in this particular domain, exposing a limited corpus of literature focused on the challenges faced by immigrant pupils in primary education with regards to their acquisition of mathematical skills. The amount of 218 articles serves as the basis for the ensuing literature review in this study.

Table 4.1

Number of Articles Based on Different Criterion

Immigrants / Refugees	Learning difficulties / problems / issues	Primary school	Mathematics (In Title)	Number of Articles
X	X			17000
X	X	X		8840
X		X	X	1540
X	X		X	389
X	X	X	X	218

Table 4.2 presents an extensive review of the 218 articles that were identified in accordance with Table 4.1, spanning the period from 2010 to 2023. The annual scholarly output concerning the mathematics learning difficulties among immigrant students in primary schools exhibits certain variations in its distribution. Throughout the 14-year timeframe, there has been a sustained level of interest in this particular research domain, albeit with some variation in the volume of published articles.

During the initial phase of the reviewed period, a limited number of articles were published, with 14 and 12 articles being published in 2010 and 2011, respectively. In the year 2012, a marginal decline was noted whereby the number of published articles amounted to a mere 8. Nonetheless, there was a notable increase in 2013, with a total of 16 articles published.

During the period spanning from 2014 to 2018, there was a consistent trend in the number of articles that were published, with fluctuations observed within the range of 12 to 17 articles per annum. The consistent nature of the research topic over the course of five years indicates a sustained interest in the subject matter.

It is noteworthy that there was a discernible upward trajectory in the quantity of published articles between 2019 and 2020, with the pinnacle being reached in 2020 with a total of 27 articles. The observed increase in the metric under consideration could potentially be linked to a range of socio-political variables or an increased emphasis on achieving educational parity in light of recent global events.

A decline in publication frequency was noted in the years 2021, 2022 and 2023, with 21, 14 and 7 articles being published, respectively. The observed decline may be attributed to various factors that necessitate additional analysis beyond the purview of this research.

In general, Table 4.2 and Figure 4.1 indicate a persistent but variable scholarly attention to the difficulties encountered by immigrant pupils in primary education when it comes to acquiring mathematical skills during the last 14 years.

Table 4.2

Distribution of Articles in the Years 2010-2023

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	total
14	12	8	16	15	17	17	12	15	20	27	21	14	7	218

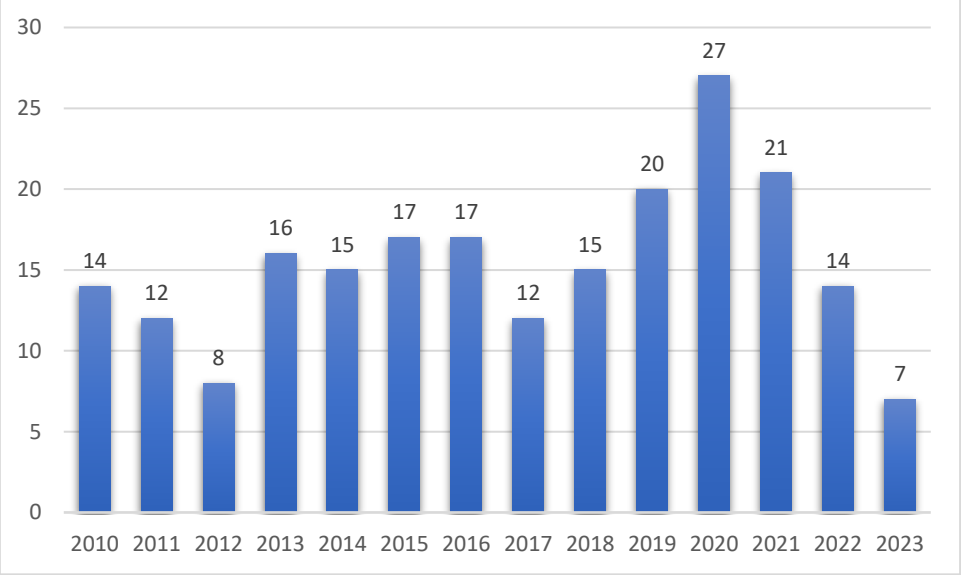

Figure 4.1 *Distribution of Articles in the Years 2010-2023*

4.2. Mathematics Learning Difficulties among Immigrant Students

The fundamental research questions and objectives are addressed in this section, which explores the findings relating to the mathematics learning difficulties experienced by immigrant students in the subject of mathematics at the primary school level. Several primary obstacles to knowledge acquisition that are frequently encountered by immigrant students have been identified via the examination of scholarly materials.

Table 4.3 summarizes the main themes of 218 relevant articles identified in Table 4.1, each of which contributes to primary school immigrant students' mathematics learning difficulties. Articles on each theme subdivision are listed.

Language Barriers: This theme covers mathematical vocabulary / terminology, symbols and notation, language interpreting / proficiency and mathematical idea expression. The most articles, 110, were about language interpreting / proficiency and mathematical expression. 32 articles examined mathematical vocabulary / terminology's effects.

Cultural Differences: This theme has four subdivisions: cultural beliefs / values / practices, educational conventions / expectations, classroom norms / behaviours and cultural influences on problem-solving strategies. Classroom norms / behaviours (110 articles) and educational system cultural conventions / expectations (87 articles) are the most discussed.

Socio-economic Challenges: This theme includes low-income backgrounds, access to educational resources, quality of instruction / learning materials and academic support. The majority of these articles (74 and 75) examined educational resources and quality of instruction. 31 articles addressed academic support.

Psychological Factors: This theme covers mathematics anxiety, math self-efficacy and confidence, learning motivation / engagement and social / emotional adjustment in the host country's educational system. The most articles (104) examined maths self-efficacy and confidence. Learning motivation / engagement was examined by 22 articles.

Educational Background and Prior Knowledge: The final theme covers differences in mathematics curricula across countries, quality and consistency of previous mathematics instruction, gaps in mathematical knowledge and understanding and familiarity with instructional approaches and assessment practices. Most of these articles addressed mathematical concept gaps (124).

Table 4.3 shows the breadth and depth of previous research, confirming the multifaceted challenges immigrant primary mathematics students face.

Table 4.3

Themes in the Previous Studies

Themes	Categories	Number of Articles
Language Barriers	Mathematical vocabulary / Mathematical terminology	32
	Symbols and notation (symbols / notation)	95
	Language interpreting / Language proficiency	110
	Expression of mathematical ideas	103
Cultural Differences	Cultural beliefs / Cultural values / Cultural practices	36
	Cultural conventions / Cultural expectations in the educational system	87
	Classroom (class) norms / Classroom (class) behaviours	110
	Cultural (culture) influences on problem-solving (problem solving) strategies	48
Socio-economic Challenges	Low-income (low income) backgrounds	63
	Access (reach / availability) to educational resources	74
	Quality of instruction / quality of learning materials	75
	Opportunities / availability for academic support / education support	31
Psychological Factors	Mathematics anxiety	36
	Self-efficacy / self-efficacy and self-confidence / self confidence in mathematics	104
	Learning motivation / engagement	22
	Social / emotional adjustment / change in the host country's educational system	57
Educational Background and Prior Knowledge	Differences in mathematics curricula across countries	52
	Quality and consistency of previous mathematics instruction	24
	Gaps in knowledge and understanding of mathematical concepts	124
	Familiarity with instructional approaches and assessment practices	31

4.2.1. Themes and Subcategories Related to Mathematics Learning Difficulties

The meta-synthesis has shown a systematised hierarchy of issues that immigrant students confront when studying mathematics. The following are examples of such topics and subdivisions:

1. Language Barriers: a. Mathematical vocabulary and terminology b. Symbols and notation c. Language in word problems and instructions d. Comprehension and expression of mathematical ideas
2. Cultural Differences: a. Cultural beliefs, values and practices in mathematics education b. Cultural conventions and expectations in the educational system c. Classroom norms and behaviours d. Cultural influences on problem-solving strategies
3. Socio-economic Challenges: a. Low-income backgrounds b. Access to educational resources c. Quality of instruction and learning materials d. Opportunities for academic support
4. Psychological Factors: a. Mathematics anxiety b. Self-efficacy and confidence in mathematics c. Motivation and engagement in learning d. Social and emotional adjustment in the host country's educational system
5. Educational Background and Prior Knowledge: a. Differences in mathematics curricula across countries b. Quality and consistency of previous mathematics instruction c. Gaps in knowledge and understanding of mathematical concepts d. Familiarity with instructional approaches and assessment practices

This hierarchical organization synthesizes the common mathematics learning difficulties among immigrant students found in the reviewed literature, capturing the complexity and diversity of challenges they face. By presenting these overarching categories and subcategories, the meta-synthesis offers a comprehensive understanding of the mathematics learning difficulties encountered by immigrant students in primary school, providing valuable insights for educators, policymakers and researchers.

4.2.2. Language Barriers

Language barriers have consistently been identified as one of the most significant challenges faced by immigrant students when learning mathematics in primary schools

(Barwell, 2016; Kaya & Ok, 2021; Moschkovich, 2012; Nunes, 2020; Purnell, 2022). This section will discuss the various aspects of language barriers that contribute to mathematics learning difficulties, including mathematical vocabulary and terminology, symbols and notation, language in word problems and instructions and comprehension and expression of mathematical ideas.

a. Mathematical vocabulary and terminology

According to Barwell (2016), it is imperative for immigrant students to acquire and comprehend mathematical vocabulary and terminology in order to proficiently comprehend and participate in mathematical concepts. According to Bartell (2011), immigrant students frequently encounter difficulties in comprehending the specialised terminology of mathematics, which may differ from the colloquial language they are accustomed to using. The existence of these difficulties may lead to misunderstandings and erroneous convictions, thus impeding their ability to communicate mathematical ideas and participate in educational activities in the classroom environment (Nunes, 2020; Purnell, 2022). Bartell (2011) suggests that educators should provide targeted support to immigrant students to improve their proficiency in mathematical vocabulary and terminology. The aforementioned goal can be attained by means of explicit instruction, employment of visual aids and provision of sufficient opportunities for practise and repetition.

b. Symbols and notation

According to Moschkovich (2012), the use of mathematical symbols and notation is crucial for representing and communicating mathematical concepts. According to De Oliveira and Cheng (2011), immigrant students may face challenges in comprehending and utilising symbols and notation owing to variations in the customs and procedures of their native nations. According to Barwell (2016), the experience of confusion and frustration can impede individuals' problem-solving skills and their capacity to interact with mathematical material. It is recommended that educators possess knowledge regarding possible variations in symbols and notation and offer clear guidance and support to immigrant learners in order to facilitate their acclimation to the academic customs employed in their new learning environment (De Oliveira & Cheng, 2011).

c. Language in word problems and instructions

According to Moschkovich (2012), immigrant students may encounter difficulties in comprehending and interpreting the language utilised in word problems and instructions owing to their restricted proficiency in the language of the host country. According to Barwell (2016), the aforementioned circumstance can lead to challenges in comprehending the problem scenario, recognising the pertinent mathematical principles and determining suitable approaches for problem resolution. In order to tackle these difficulties, educators ought to employ unambiguous and succinct language, furnish visual aids and contextual information and proffer chances for pupils to deliberate and elucidate their comprehension of word problems and directives (Barwell, 2016).

d. Comprehension and expression of mathematical ideas

According to Moschkovich (2012), the insufficient language proficiency of immigrant students may have an adverse effect on their capacity to comprehend and articulate mathematical concepts proficiently. According to Barwell (2016), such circumstances may result in challenges with respect to engaging in classroom discourse, comprehending elucidations and illustrations and articulating one's rationale and resolutions. According to Bartell (2011), in order to enhance the mathematical comprehension and expression skills of immigrant students, it is imperative for teachers to establish an inclusive and supportive learning atmosphere that recognises and promotes diverse methods of representing and communicating mathematical concepts. In order to facilitate the communication of mathematical concepts among immigrant students, it is recommended that educators offer specific language assistance, such as the provision of sentence prompts and visual aids, as a means of scaffolding their learning process (Bartell, 2011).

In conclusion, the existence of linguistic barriers presents a significant hindrance for immigrant students in their pursuit of mathematical proficiency during their primary education. The academic achievement of immigrant students in mathematics can be enhanced by educators who recognise and tackle the challenges they encounter in mathematical vocabulary and terminology, symbols and notation, language in word

problems and instructions and comprehension and expression of mathematical concepts.

4.2.3. Cultural Differences

The existence of cultural discrepancies could potentially act as a causative element in the difficulties experienced by migrant students in grasping mathematical principles. The process of obtaining mathematical knowledge is influenced by cultural beliefs, values and practises, which demonstrate significant diversity across various cultural contexts (Bishop, 2012). Planas and Civil (2017, 2018a, 2018b) have suggested that immigrant students may face difficulties in adjusting to novel learning environments owing to their unfamiliarity with the cultural norms and anticipations of the educational system of the host nation. This can result in misunderstandings and difficulties for these students. This segment will examine the diverse elements of cultural disparities that give rise to challenges in comprehending mathematics, encompassing cultural convictions, principles and customs in mathematics instruction; cultural traditions and prospects in the educational framework; classroom standards and conduct; and cultural impacts on problem-solving approaches.

a. Cultural beliefs, values and practices in mathematics education

According to Civil and Planas (2014), immigrant students exhibit a range of cultural backgrounds that are characterised by unique beliefs, values and practises in relation to mathematics education. The variations in students' mathematical engagement, societal perception of mathematics and learning and problem-solving strategies can become apparent (Costanzi et al., 2012; Orosco & Abdulrahim, 2017). It is imperative for educators to acknowledge the possible disparities among immigrant students and strive to establish all-encompassing learning settings that appreciate and enhance the varied cultural assets that these students bring to the mathematics classroom (Civil & Planas, 2014).

b. Cultural conventions and expectations in the educational system

According to Turner et al. (2013), there may exist variations in the teaching and learning conventions, assessment methods and student-teacher relationships between

the educational system of the host country and the home countries of immigrant students. The variances that exist between the mathematical education systems of different countries can pose difficulties for immigrant students as they acclimatise to new approaches to learning mathematics and negotiate the social and academic norms of their new educational environment (Hsieh, 2017; Nunes, 2020). According to Turner et al. (2013), it is imperative for educators to endeavour towards establishing a hospitable and encouraging atmosphere that facilitates immigrant students in comprehending and manoeuvring through these disparities while upholding and esteeming their cultural origins.

c. Classroom norms and behaviours

The cultural diversity in classroom norms and behaviours can have a significant impact on the interactions of students with their teachers, peers and learning resources, as noted by Kaya and Ok (2021). Immigrant students may encounter challenges in adapting to novel classroom norms and behaviours, which may have an adverse effect on their capacity to engage in mathematics education (Schipolowski et al., 2021; You et al., 2016). In order to facilitate the assimilation of immigrant students into the academic environment, it is recommended that educators clearly articulate the anticipated standards and conduct within their instructional spaces, while also affording learners the chance to rehearse and enhance their comprehension of these protocols (Schipolowski et al., 2021).

d. Cultural influences on problem-solving strategies

The approaches and engagement of students in mathematical problem-solving can be influenced by their diverse cultural backgrounds (Costanzi et al., 2012; Fredy et al., 2021). Immigrant students may exhibit varied approaches to problem-solving that are influenced by their cultural backgrounds and previous mathematical education (Platt, 2013; Sullivan, 2011). The educational strategies employed by immigrant students may not necessarily conform to the norms and conventions of the educational system of the host country, thereby posing challenges for them in exhibiting their mathematical proficiency and comprehension (Civil & Planas, 2014). It is crucial for educators to recognise and value the diverse problem-solving strategies that are presented by immigrant students within the framework of mathematics education. It is imperative

that educators offer support to these students to promote the assimilation and amplification of these tactics, thus empowering them to competently engage with mathematical principles (Platt, 2013).

In conclusion, it is apparent that cultural differences can significantly impact the academic experiences of immigrant students in the context of mathematics education at the primary school level. By recognising and acknowledging the differences in cultural beliefs, values and practises in mathematics education, as well as the cultural conventions and expectations within the educational system, classroom norms and behaviours and cultural influences on problem-solving strategies, educators can support the academic advancement of immigrant students in mathematics and help them overcome these challenges to achieve success.

4.2.4. Socio-economic Challenges

Inadequate access to educational resources and low-income backgrounds, for example, can contribute to the development of mathematics learning difficulties among immigrant students (Lai et al., 2013; Pellegrini et al., 2018). The academic performance of students in mathematics can be affected by their socio-economic status, which may limit their access to academic support, high-quality instruction and learning resources (Ndijuye, 2022). Insufficient educational assistance, resources, instructional methods and socioeconomic position are some of the factors that can contribute to the challenges stated. Lack of educational resources and procedures are major factors that exacerbate this issue (Hsieh, 2017; Pellegrini et al., 2018).

a. Low-income backgrounds

Lee et al. (2022) found low-income people struggle with housing, nutrition and finances. According to Crosnoe and López Turley (2011), socioeconomic background of immigrant students may affect academic success in mathematics. This remarkable discovery was meticulously considered. Their analysis concluded. The aforementioned challenges may potentially result in negative impacts on the individuals' physical and emotional well-being, as well as their ability to concentrate and engage in academic pursuits. Educators must recognise the aforementioned obstacles and create favourable

learning environments that address the diverse needs of low-income immigrant students.

b. Access to educational resources

Crosnoe and López Turley (2011) argue that immigrant students' capacity to study and succeed in mathematics may be hindered by the lack of resources available to them in their schools. Moreover, Pellegrini et al. (2018) posits that individuals originating from low-income backgrounds may face obstacles in acquiring technological resources, textbooks and other educational materials that can enhance their mathematical understanding and progress. It is imperative for educational institutions and instructors to prioritise the attainment of equal access to educational resources for everyone in the classroom. This includes the provision of supplementary assistance and materials for immigrant students who may encounter impediments in accessing these resources.

c. Quality of instruction and learning materials

According to Crosnoe and López Turley (2011), the mathematics learning experiences and outcomes of immigrant students can be significantly influenced by the calibre of instruction and learning materials provided to them. Students hailing from low-income backgrounds may be enrolled in schools that offer limited resources, employ less experienced teachers and provide inferior quality instructional materials, thereby having an adverse impact on their mathematical attainment (Kaya & Ok, 2021; Wesley, 2020). It is recommended that educators and policymakers give precedence to enhancing the calibre of teaching and learning resources for immigrant students. This can be achieved through the provision of professional development opportunities for teachers, allocation of resources towards top-notch instructional materials and provision of specialised assistance to schools catering to immigrant and low-income populations (Sullivan, 2011).

d. Opportunities for academic support

Immigrant students may encounter restricted avenues for academic assistance beyond the confines of the classroom, thereby amplifying their struggles in comprehending mathematical concepts, according to Crosnoe and López Turley (2011). Individuals from economically disadvantaged backgrounds may encounter

barriers to obtaining academic support such as tutoring, afterschool programmes and other resources that can facilitate the development of their mathematical comprehension and proficiencies (Nunes, 2020; Purnell, 2022). It is recommended that educational institutions and instructors implement tailored academic assistance for immigrant pupils, such as supplementary instruction, extracurricular activities and other measures intended to tackle their distinct requirements and obstacles (Hsieh, 2017).

To conclude, it can be observed that socio-economic obstacles have a noteworthy influence on the academic progress and achievements of immigrant pupils in the domain of mathematics during their primary education. Educators can facilitate the success of immigrant students in mathematics learning by acknowledging and tackling the challenges associated with low-income backgrounds, limited access to educational resources, inadequate quality of instruction and learning materials and insufficient opportunities for academic support.

4.2.5. Psychological Factors

Different psychological factors can have a substantial effect on the development of mathematical competence among primary school immigrant students, as reported by Dowker et al. (2016). Students' levels of anxiety, self-efficacy and motivation may all play a role in how quickly or slowly immigrant students acquire proficiency in mathematics (Gilbert, 2023; Kamuru, 2020). Concerns about language barriers, cultural differences and social integration have been mentioned by Lazarides and Buchholz (2019) as possible causes of math anxiety among immigrant students. A lack of confidence and enthusiasm might make it much harder for students to learn and do well in maths (Kamuru, 2020). This section examines psychological factors affecting mathematical learning challenges. These factors may affect students' mathematics anxiety, self-efficacy, confidence, motivation, engagement and social and emotional adjustment in the host country's educational system.

a. Mathematics anxiety

The occurrence of mathematics anxiety, characterised by feelings of tension, discomfort and apprehension associated with mathematics, has the capacity to

negatively impact the academic achievements and outcomes of immigrant students in the field of mathematics (Dowker et al., 2016). According to Lyons and Beilock's (2012) research, students who face language barriers, cultural disparities and challenges in adjusting to a new educational system may experience heightened levels of anxiety. It is crucial for educators to recognise the potential presence of mathematics anxiety within the immigrant student population and develop strategies to mitigate anxiety and promote emotional well-being in the context of mathematics education.

b. Self-efficacy and confidence in mathematics

Self-efficacy and confidence in mathematics can have a significant impact on how well immigrant students connect with and perform in mathematics learning (Bandura, 1997). In mathematics learning, language barriers, cultural disparities and unfamiliarity with the educational system of the host country may lead to reduced self-efficacy and confidence among immigrant students (Gilbert, 2023; Hsieh, 2017; Schipolowski et al., 2021). It is advisable for educators to prioritise the augmentation of self-efficacy and confidence among immigrant students in mathematics by offering customised support, positive feedback and opportunities for accomplishment within the mathematics educational setting.

c. Motivation and engagement in learning

The importance of motivation and engagement in the process of learning cannot be overstated, especially with regards to the academic achievement of students in the field of mathematics (Lai et al., 2013; Pellegrini et al., 2018; Sullivan, 2011). linguistic barriers, cultural differences and the difficulties associated with adapting to a new educational environment may impede the motivation and engagement of immigrant students in their education (Ferri et al., 2023; Nunes, 2020). Educators must prioritise the establishment of comprehensive and supportive learning environments that foster motivation and engagement among immigrant students. The aforementioned objective can be attained through the utilisation of cultural and linguistic resources, provision of relevant and meaningful educational experiences and provision of focused support and encouragement (Schipolowski et al., 2021; Sullivan, 2011).

d. Social and emotional adjustment in the host country's educational system

The incorporation of immigrant students into the educational system of the host nation, with regard to their social and emotional integration, can significantly impact their experiences and outcomes in mathematics learning (Suárez-Orozco et al., 2010). Additionally, Suárez-Orozco et al. (2010) have suggested that students may experience emotions such as isolation, stress and frustration when faced with the challenges of adapting to a new cultural and academic environment. It is crucial for educators to demonstrate awareness and consideration of the social and emotional needs of immigrant students (Costanzi et al., 2012; Cui et al., 2022). In order to facilitate the successful adaptation and academic achievement of these students within their new educational environment, it is recommended that educators provide targeted assistance such as social and emotional learning initiatives, peer mentorship opportunities and culturally responsive instructional methods, specifically within the context of mathematics education (Sullivan, 2011).

To conclude, it can be observed that psychological factors have a noteworthy influence on the educational encounters and achievements of immigrant pupils in the domain of primary school mathematics. Educators can facilitate the success of immigrant students in mathematics learning by comprehending and tackling the factors associated with mathematics anxiety, self-efficacy and confidence in mathematics, motivation and engagement in learning and social and emotional adjustment within the educational system of the host country.

4.2.6. Educational Background and Prior Knowledge

The educational background and pre-existing mathematical knowledge of immigrant students may have an impact on their learning within the educational system of the host country (Claessens & Engel, 2013; Holopainen et al., 2017). According to Moschkovich (2012), the learning experiences and outcomes of immigrant students in primary school mathematics can be significantly impacted by their educational background and prior knowledge. The present section will examine diverse facets of educational background and pre-existing knowledge that give rise to challenges in learning mathematics. These include variations in mathematics curricula across different nations, the calibre and uniformity of prior mathematics instruction,

deficiencies in comprehension and knowledge of mathematical concepts and acquaintance with instructional methodologies and evaluation procedures (Schipolowski et al., 2021; Sullivan, 2011).

a. Differences in mathematics curricula across countries

According to Moschkovich (2012), immigrant students may face difficulties in adjusting to the educational system of the host country due to variations in mathematics curricula across different nations. Immigrant students may have been introduced to distinct mathematical content, concepts and problem-solving strategies, leading to potential gaps in their comprehension and knowledge when transitioning to a new curriculum. It is imperative for educators to acknowledge the possible disparities among immigrant students and offer tailored assistance to facilitate their integration and academic achievement in the field of mathematics (Akay & Boz, 2010; Hemmi et al., 2018).

b. Quality and consistency of previous mathematics instruction

The experiences and success of immigrant students in primary school mathematics can be profoundly influenced by the quality and consistency of their prior maths training (Moschkovich, 2012). Immigrant students may encounter difficulties in adjusting to the instructional practises and expectations of the host country due to their exposure to diverse instructional approaches and varying levels of teacher quality in their home countries (Cui et al., 2022; Hemmi et al., 2018). It is imperative for educators to endeavour towards delivering consistent and high-quality instruction that capitalises on the prior experiences of immigrant students and facilitates their continuous mathematical development (Sullivan, 2011).

c. Gaps in knowledge and understanding of mathematical concepts

Immigrant students' capacity to engage in and excel in mathematics learning can be hampered by gaps in knowledge and understanding of mathematical concepts (Moschkovich, 2012). Disparities in curricula, instructional methodologies and educational resources among nations may give rise to these disparities, as noted by Cui et al. (2022). It is imperative for educators to recognise and rectify any deficiencies in the comprehension and expertise of immigrant learners. This can be achieved through

tailored guidance and assistance, aimed at facilitating the development of a strong basis in mathematical principles and proficiencies.

d. Familiarity with instructional approaches and assessment practices

The acquisition of knowledge regarding instructional approaches and assessment practises can have a substantial impact on the educational experiences and achievements of immigrant students in the domain of primary school mathematics, according to Moschkovich (2012). Students who are immigrants may exhibit limited familiarity with the instructional methodologies and evaluation techniques employed in the host nation, such as collaborative learning, inquiry-based instruction, standardised testing and formative assessment (Dolapcioglu & Bolat, 2021; Holopainen et al., 2017). It is recommended that educators offer clear and direct guidance and assistance to immigrant students in comprehending and participating in instructional approaches and assessment practises, thereby promoting their achievement in the field of mathematics (Platt, 2013).

To conclude, the educational background and prior knowledge of immigrant students can have a noteworthy influence on their learning experiences and achievements in the domain of primary school mathematics. Educators can facilitate the academic success of immigrant students in mathematics by acknowledging and tackling the factors that contribute to disparities in mathematics curricula, the calibre and uniformity of prior mathematics instruction, deficiencies in comprehension and knowledge of mathematical concepts and familiarity with pedagogical methods and evaluation techniques.

4.3. Factors Contributing to Mathematics Learning Difficulties

The analysis of academic literature spanning from 2010 to 2023 has revealed various factors that contribute to the challenges encountered by immigrant students in comprehending primary school mathematics. This section pertains to the aforementioned factors and endeavours to address research question 2 and objective 3.

1. Language Barriers: the presence of language barriers constitutes a significant contributing factor to the academic challenges experienced by immigrant

students (Kaya & Ok, 2021; Nunes, 2020; Purnell, 2022). The discipline of mathematics frequently employs specialised terminology, symbolic representations and linguistic frameworks that may pose difficulties for learners lacking fluency in the language of pedagogy. According to Moschkovich (2012), the understanding and communication of mathematical concepts and problem-solving strategies among immigrant students may be impeded by language barriers.

2. Cultural Differences: Immigrant students may experience mathematics learning difficulties as a result of cultural variations in ideas, attitudes and practises linked to mathematical instruction (Bishop, 2012). The lack of familiarity with cultural norms and expectations of the educational system in the host country among immigrant students may result in challenges and misinterpretations when adjusting to novel learning environments. In addition, the existence of dissimilarities in communication patterns, approaches to resolving problems and classroom conventions across cultures can intensify challenges in the process of learning (Civil & Planas, 2014).
3. Prior Educational Experiences: Variances in previous educational backgrounds, such as curricular content, instructional methods and evaluation techniques, may lead to challenges in the learning process for immigrant pupils (Wesley, 2020). Individuals who have encountered non-traditional educational systems may encounter difficulties in adjusting to novel mathematical curricula and pedagogical approaches, resulting in deficiencies in their comprehension and mastery of the subject matter.
4. Socio-economic Challenges: It is possible that a number of socio-economic challenges, such as material deprivation, housing instability and a lack of access to educational resources, have an effect on the mathematical knowledge acquired by immigrant students. The results of the study that Han (2016) carried out lend credence to these findings. It's probable that those from lower socioeconomic backgrounds had less access to high-quality mathematics education and helpful resources inside their own countries. This is something to keep in mind when looking at the results of this study. Students may find it much more challenging to concentrate on their schoolwork as a result of this.
5. Psychological Factors: Psychological factors, such as anxiety, low self-efficacy and motivation, are significant contributors to the learning challenges

experienced by immigrant students in mathematics. The academic performance of students may be impeded by their apprehension or uncertainty regarding their mathematical abilities (Gilbert, 2023; Kamuru, 2020).

6. Social Integration and Peer Relations: According to Lazarides and Buchholz's (2019) hypothesis, the degree to which immigrant students are socially integrated and the quality of their peer interactions may be related to the mathematical challenges they face. According to the findings of a body of academic literature, students who have the perception that they are socially excluded or ostracized from their classmates are more likely to suffer from elevated levels of anxiety, in addition to decreased motivation and engagement in the process of learning. According to the findings of the research, these circumstances have a detrimental effect on the mathematical abilities of the individuals. Immigrant students may have academic challenges, but they can overcome them with the help of classmates who are encouraging to them and a community that is accepting of them.
7. Family Factors: Mathematics learning difficulties for immigrant students may be exacerbated by familial factors such as parental education, socioeconomic status and cultural attitudes (Han, 2016). The educational background, socio-economic status and cultural beliefs of parents can exert an impact on the resources and support that are accessible to immigrant students, as well as their expectations and attitudes towards the acquisition of mathematical knowledge. Furthermore, the participation of parents in their offspring's education can have a significant impact on reducing academic challenges and promoting scholastic success.

The meta-synthesis results indicate that there are various factors that contribute to the challenges faced by immigrant students in learning primary school mathematics. This conclusion is drawn from the analysis of multiple studies. The interplay of these factors can give rise to intricate and diverse predicaments for students who are immigrants. Comprehending the aforementioned factors that play a role in the academic performance of immigrant students is crucial in devising tailored interventions and support structures that cater to their distinct requirements in the domain of mathematics education.

4.4. Strategies and Interventions

The literature meta-synthesis spanning from 2010 to 2023 has revealed a number of efficacious strategies and interventions that can be employed to facilitate mathematics learning among immigrant students, thereby fulfilling the research question 3 and objective 4. The subsequent discussion presents the aforementioned discoveries:

1. Culturally Responsive Teaching: In order to support immigrant students in their mathematics learning, culturally responsive teaching is a critical method (Gay, 2018). The approach in question pertains to the customization of instruction to align with the varied cultural backgrounds, experiences and perspectives of immigrant students, thereby guaranteeing an inclusive and considerate learning milieu that caters to their requirements (Civil & Planas, 2014). According to Bishop (2012), the integration of students' cultural backgrounds and experiences in mathematics education can improve their engagement, comprehension and motivation.
2. Language Support: Immigrant students can overcome language barriers in mathematics learning with the assistance of language support (Barwell, 2009). The instructional method may encompass direct guidance on mathematical terminology and linguistic structures, in addition to incorporating visual aids, manipulatives and practical illustrations to reinforce understanding (Moschkovich, 2012). Moreover, the utilisation of bilingual or multilingual instruction, coupled with the involvement of language experts, has been shown to be efficacious in tackling language obstacles (Cocking & Mestre, 2013; Sullivan, 2011).
3. Peer Support and Collaborative Learning: According to Lazarides and Buchholz (2019), the implementation of peer support and collaborative learning strategies can be beneficial for immigrant students in overcoming social and psychological obstacles in the realm of mathematics education. The implementation of group work, peer tutoring and cooperative learning activities can facilitate favourable peer relationships, amplify motivation and advance students' comprehension of mathematical concepts by affording them with occasions to learn from each other (Platt, 2013; Sullivan, 2011).

4. Differentiated Instruction: Tomlinson (2014) suggests that differentiated instruction is a viable approach to facilitate the mathematics learning of immigrant students. The approach in question pertains to the modification of instructional content, process and product to cater to the varied needs and capabilities of immigrant pupils. The aim is to guarantee that all students are provided with suitable and stimulating learning prospects (Han, 2016). The implementation of differentiated instruction can encompass various strategies such as flexible grouping, tiered assignments and individualised learning plans to cater to the diverse learning needs and backgrounds of students.
5. Parental Involvement and Family Support: Facilitating parental involvement and family support is imperative in promoting the academic success of immigrant students in the domain of mathematics (Dolapcioglu & Bolat, 2021; Holopainen et al., 2017). Educational institutions can enhance parental involvement in their children's mathematics education by offering various resources, workshops and communication tools. These resources can help parents comprehend the mathematics curriculum and instructional approaches, as well as equip them with strategies to support their children's learning at home (Platt, 2013; Sullivan, 2011). Moreover, cultivating robust connections between educational institutions and immigrant households may facilitate the establishment of a nurturing academic milieu for immigrant students.
6. Professional Development and Teacher Training: The provision of professional development and training to educators is crucial in furnishing them with the requisite knowledge, competencies and materials to proficiently facilitate the mathematics learning of immigrant students (Civil & Planas, 2014). Professional development opportunities such as workshops, seminars and courses that concentrate on culturally responsive teaching, language support strategies and differentiated instruction can be beneficial. Additionally, teachers can benefit from learning about the unique needs and challenges encountered by their immigrant students (Purnell, 2022).

To conclude, the results obtained from the meta-synthesis indicate that various approaches and measures have the potential to be efficacious in facilitating the acquisition of mathematical skills among immigrant students. The implementation of a thoughtful combination of strategies can effectively tackle the distinctive requirements

and obstacles encountered by immigrant students, thereby promoting their academic achievement and holistic welfare in the domain of mathematics education.

4.5. Synthesis and Discussion

The literature meta-synthesis spanning from 2010 to 2023 has yielded significant findings regarding the mathematical learning challenges encountered by immigrant learners in primary school, along with the underlying factors that contribute to these challenges. Additionally, the review of the literature has identified efficacious strategies and interventions for facilitating the learning of these students. The present section amalgamates the results, examines their significance for educators, policymakers and researchers and links them to the research questions and objectives.

The present analysis has identified prevalent learning challenges encountered by immigrant students in the domain of mathematics. These challenges include language barriers, cultural differences, pre-existing educational backgrounds, socio-economic obstacles, psychological factors, social assimilation and familial influences. This is in accordance with the findings of previous studies (Bishop, 2012; Han, 2016). The aforementioned discoveries pertain to the first research question and the second objective, underscoring the intricate and diverse characteristics of the obstacles encountered by immigrant students in their acquisition of mathematical knowledge.

Comprehending the elements that contribute to the aforementioned learning challenges is imperative in the development of focused interventions and support structures aimed at catering to the distinct requirements of immigrant students (Civil & Planas, 2014). The aforementioned statement pertains to the examination of research question 2 and the attainment of objective 3. Its significance lies in the guidance it provides to educators and policymakers, who must take into account these variables while formulating and executing mathematics curricula, teaching methods and assistance programmes for immigrant learners.

The meta-synthesis has revealed efficacious approaches and interventions that aid immigrant students in their acquisition of mathematical knowledge. These include culturally responsive teaching, language assistance, collaborative learning, peer support, differentiated instruction, family support and parental involvement and teacher

training and professional development. (Gay, 2018; Moschkovich, 2012; Lazarides & Buchholz, 2019). The aforementioned results pertain to the third research question and the fourth objective, offering significant direction for educators, policymakers and researchers who aim to enhance the academic achievements and welfare of immigrant students in the domain of mathematics education.

The outcomes of this meta-synthesis hold significant implications for stakeholders operating within the domain of mathematics education. The research underscores the necessity for educators to adopt tailored and adaptable teaching strategies that take into account the heterogeneous backgrounds and educational requirements of immigrant learners (Tomlinson, 2014). The implementation of culturally responsive teaching practises, language support, differentiated instruction and the promotion of positive social environments and parental involvement have been identified as potential strategies to address this issue (Bishop, 2012).

The statement made by Han (2016) highlights the significance of conducting additional research on the challenges faced by immigrant students in mathematics. It emphasises the importance of creating and assessing successful approaches and interventions to address these issues. This information is relevant to researchers in the field. It is recommended that forthcoming research also takes into account plausible gaps, prejudices, or constraints in the current body of literature, along with the influence of contextual factors (such as country, educational system and socio-cultural background) on the educational experiences of immigrant students (x`; Purnell, 2022; Sullivan, 2011).

The meta-synthesis offered a comprehensive overview of the difficulties immigrant students have when studying primary school mathematics, as well as the underlying reasons that lead to these difficulties and effective approaches and solutions for assisting their learning. These results, when taken together, provide a complete review of the subject matter. The implications of these findings are significant for persons working in the domains of education, policy-making and research. These professionals bear a key duty in encouraging the academic progress and general welfare of immigrant students throughout their mathematical education. The implications of these findings are significant for those working in the disciplines of education, policy-making and research.

4.6. Summary

In Chapter 4, a meta-synthesis of literature published from 2010 to 2023 is presented, providing a thorough comprehension of the obstacles that immigrant students face when learning mathematics at the primary school level. The present chapter studied the elements that give rise to these difficulties and efficacious approaches and solutions that can be implemented to facilitate the gaining of knowledge. The research conducted an exhaustive examination of common hindrances to the learning process, encompassing factors such as linguistic barriers, divergent cultural backgrounds, prior educational experiences, economic limitations, psychological factors, social integration and familial situations. Furthermore, the aforementioned underscored the importance of understanding the factors that contribute to these difficulties. The development of targeted interventions and supportive frameworks is of paramount importance. The research has identified a number of efficacious tactics and interventions that can be employed to augment the academic achievements of students. The aforementioned strategies encompass culturally responsive education, linguistic assistance, peer collaboration and support, differentiated teaching approaches, parental engagement and familial assistance and professional development and educator preparation. The outcomes of the meta-synthesis bear significant ramifications for diverse parties, such as academicians, policymakers and scholars. The results emphasise the significance of employing customised and flexible pedagogical approaches, advocating comprehensive educational regulations and carrying out further inquiries on the obstacles encountered by migrant learners in the field of mathematics. By means of synthesising the research findings and engaging in a discourse regarding their implications, this specific chapter has proficiently tackled the research questions and objectives of the study. Consequently, the findings have yielded significant perspectives that can be implemented in the realm of mathematics instruction for immigrant learners.

CHAPTER 5 - CONCLUSIONS AND RECOMMENDATIONS

5.1. Summary of Findings

Important findings that answer the research questions and objectives were obtained from the thorough literature analysis and meta-synthesis carried out in this study. The aforementioned results are briefly outlined as follows:

1. Specific learning challenges faced by immigrant students while learning mathematics in primary school: The analysis revealed several common mathematics learning difficulties, including language barriers (Cui et al., 2022), cultural differences (Bishop, 2012), prior educational experiences (Han, 2016), socio-economic challenges (Nunes, 2020), psychological factors (Lazarides & Buchholz, 2019), social integration (Moschkovich, 2012) and family factors (Dolapcioglu & Bolat, 2021). The aforementioned discoveries offer a thorough comprehension of the intricate and diverse characteristics of the obstacles encountered by immigrant students in their mathematical education, satisfying the first research question.
2. Factors contributing to mathematics learning difficulties: The research has identified a variety of elements that contribute to the challenges faced by immigrant students in comprehending mathematical concepts, such as language proficiency, cultural background, prior educational experiences, socio-economic status, psychological factors, social integration and family factors (e.g., Civil & Planas, 2014). Comprehending these factors holds paramount importance in devising focused interventions and support mechanisms to cater to the distinct requirements of immigrant students, thereby fulfilling the research question 2.
3. Effective strategies and interventions for supporting immigrant students in mathematics learning: The meta-synthesis has identified a number of efficacious strategies and interventions, including culturally responsive teaching (Gay, 2018), language support, peer support and collaborative learning (Moschkovich, 2012), differentiated instruction (Tomlinson, 2014), parental involvement and family support and professional development and teacher

training (Han, 2016). The aforementioned discoveries offer significant insights for academics, policymakers and researchers who aim to enhance the academic achievements and welfare of immigrant students in the domain of mathematics education. This pertains to the examination of 3rd research question.

4. Solutions such as adapted curriculum based on cultural differences, supplement lesson in different languages, peer support and other practices can be recommended for educators, policymakers and researchers on how to enhance mathematics learning experiences for immigrant students in primary school is research question 4.

The present study provides a comprehensive analysis of the challenges encountered by immigrant students in the domain of primary school mathematics, the underlying factors that contribute to these challenges and efficacious approaches and remedies for facilitating their academic progress. The analysis has yielded valuable insights that hold considerable implications for educators, policymakers and researchers. These insights underscore the importance of implementing instructional approaches that are tailored and adaptable, as well as inclusive educational policies. Furthermore, there is a pressing need for additional research on the subject of mathematics learning difficulties experienced by immigrant students.

5.2. Conclusions

The systematic literature review and meta-synthesis have yielded various conclusions concerning the challenges encountered by immigrant students in primary school mathematics, the underlying factors that contribute to these challenges and the efficacious strategies and interventions that can be employed to facilitate their learning.

To begin with, it is undeniable that immigrant students face a wide variety of interrelated challenges in their pursuit of mathematics, including but not limited to language barriers, cultural differences, previous educational backgrounds, socio-economic challenges, psychological elements, social integration and family circumstances (Barwell, 2009; Bishop, 2012; Civil & Planas, 2014; Han, 2016; Lazarides & Buchholz, 2019; Moschkovich, 2012). The findings of this research highlight the complexity of the challenges faced by immigrant students and the need

for comprehensive and varied approaches to facilitating their mathematical knowledge accumulation.

Secondly, the factors contributing to mathematics learning difficulties among immigrant students are complex and multifaceted, necessitating targeted interventions and support systems that address the unique needs of these learners. Educators and policymakers can create more effective and inclusive educational environments for immigrant students by comprehending the interdependence among language proficiency, cultural background, prior educational experiences, socio-economic status, psychological factors, social integration and family factors (Civil & Planas, 2014).

Finally, the meta-synthesis has identified a number of efficacious strategies and interventions that can be employed to provide support to immigrant students in their pursuit of mathematics education, including culturally responsive teaching (Gay, 2018), language support, peer support and collaborative learning (Moschkovich, 2012), differentiated instruction (Tomlinson, 2014), parental involvement and family support and professional development and teacher training (Han, 2016). The aforementioned strategies hold noteworthy ramifications for educators, policymakers and researchers, as they offer valuable direction for enhancing the academic achievements and welfare of immigrant students in the domain of mathematics education.

This study highlights the importance of understanding and addressing the mathematics learning difficulties faced by immigrant students in primary school and the need for targeted, responsive and inclusive instructional approaches and policies. Through the implementation of efficient strategies and interventions ascertained in this research, educators, policymakers and researchers can make a valuable contribution towards enhancing the educational experiences and outcomes of immigrant students, thereby promoting their success and integration within their novel learning environments.

5.3. Recommendations for Practice

Drawing from the outcomes of the systematic literature review and meta-synthesis, we propose practical suggestions for educators, policymakers and school administrators

to facilitate the mathematics learning of immigrant students, with a focus on research question 4:

1. Culturally responsive teaching: Teaching methods that are culturally responsive to students' backgrounds and experiences should be taught to educators (Gay, 2018). Math teachers can get specific training to increase their knowledge about the immigrant's background and the previous education system. These methods include taking into account the cultural knowledge and perspectives of immigrant students when developing maths lessons and fostering inclusive learning environments that value diversity.
2. Language support: It is recommended that educational institutions offer specific language assistance to students who are immigrants. This may involve supplemental lessons in the language that is being used to educate, purposeful training on mathematical terminology and language and the deployment of visual aids and support structures to boost the student's ability to comprehend the material (Cui et al., 2022).
3. Peer support and collaborative learning: Group projects and problem-solving exercises are great examples of teacher-facilitated collaborative learning that may help immigrant students make connections with their peers, share their stories and learn from one another (Moschkovich, 2012).
4. Differentiated instruction: Teachers should use diversified education strategies to meet the varied needs of their immigrant students (Tomlinson, 2014). This may be done by allowing students to work at their own pace and with varying degrees of difficulty, as well as by providing a variety of representations, activities and expressions for mathematics.
5. Parental involvement and family support: Schools can actively encourage and facilitate parental involvement and family support in the mathematics learning of immigrant students by providing information and resources in the families' native languages; hosting workshops and meetings to discuss educational expectations and strategies; and giving parents opportunities to contribute to their children's learning experiences (Dolapcioglu & Bolat, 2021).
6. Professional development and teacher training: It is recommended that policymakers and school administrators allocate resources towards continuous professional development and teacher training initiatives that are tailored to

address the specific requirements of immigrant students in the realm of mathematics education, as suggested by Han (2016). It is recommended that these programmes encompass subject matters such as culturally responsive teaching, language support strategies and differentiated instruction. Additionally, they should offer avenues for educators to exchange optimal practises and acquire knowledge from professionals in the field.

7. Inclusive educational policies: It is recommended that policymakers formulate and execute educational policies that are inclusive in nature and take into account the distinctive obstacles encountered by immigrant students in the field of mathematics education. The aforementioned policies encompass financial provisions for specialised support initiatives, directives for designing an inclusive curriculum and strategies to guarantee fair admission to exceptional mathematics education for all students, irrespective of their socio-economic status or personal situations.

Through the implementation of these practical suggestions, educational professionals, policymakers and school leaders can foster an environment that is conducive to the academic success, social integration and overall well-being of immigrant students by promoting inclusive and supportive learning environments for the acquisition of mathematical knowledge.

5.4. Recommendations for Future Research

The following topics for additional inquiry and prospective research paths are recommended in order to broaden the body of knowledge and literature already available on mathematics learning difficulties among immigrant students:

1. Longitudinal studies: Prospective examinations could derive advantages from longitudinal inquiries that monitor the mathematical learning encounters and achievements of migrant students across a duration. According to Fry (2010), conducting research on mathematics learning difficulties and analysing the effectiveness of interventions and support strategies can yield significant knowledge on the enduring consequences of such difficulties and their influence on students' academic performance and general welfare.

2. Comparative studies: Further comparative research is needed to examine the learning challenges encountered by immigrant students across diverse nations, educational frameworks and socio-cultural milieus. Such studies could facilitate the identification of commonalities and disparities in the obstacles encountered by these learners, as well as the efficacy of different forms of support interventions (Lazarides & Buchholz, 2019).
3. Intersectionality: It is recommended that forthcoming research take into account the intersectionality of multiple variables, including gender, socio-economic status, race and ethnicity, in the analysis of the challenges encountered by immigrant pupils in the field of mathematics. An exploration into the potential ways in which these overlapping variables may exacerbate or alleviate educational obstacles could yield a more intricate comprehension of the hurdles encountered by heterogeneous immigrant student demographics.
4. Technology-based interventions: Further studies may delve into the prospective efficacy of technology-cantered interventions, such as digital learning platforms, adaptable learning systems and instructional games, in facilitating the acquisition of mathematical skills among immigrant students. Such studies could provide valuable insights into the effectiveness and feasibility of using technology to address mathematics learning difficulties and enhance academic outcomes (Clements & Sarama, 2016).
5. Teacher perspectives: Future research should also consider the perspectives of teachers in relation to the mathematics learning difficulties faced by immigrant students. Investigating teachers' experiences, beliefs and practices could provide important insights into the factors that influence the support provided to immigrant students and inform the development of targeted professional development and teacher training programmes (Han, 2016).
6. Student voices: Research that actively involves immigrant students as participants and seeks to understand their perspectives on their mathematics learning difficulties, experiences and support needs could contribute to a more comprehensive understanding of the challenges faced by these learners and help to identify effective strategies and interventions from their point of view (Bishop, 2012).

By addressing these research gaps and exploring the suggested research directions, future studies can contribute to expanding the knowledge base on mathematics learning difficulties among immigrant students, informing the development of more effective support strategies and educational policies that promote the academic success and social integration of these learners.

5.5. Limitations

Despite the valuable insights gained through this systematic literature review and meta-synthesis, several limitations must be acknowledged. Firstly, the scope of the literature review was confined to articles published between 2010 and 2023, which may have excluded some relevant studies conducted prior to or after this time period. Moreover, the focus on articles published in English may have led to the exclusion of important research conducted in other languages (Schroll-Machl, 2017).

Secondly, potential biases may exist in the selection and interpretation of the reviewed articles. The literature search, screening and analysis were conducted by a single researcher, which might have introduced subjective biases in the inclusion and exclusion of articles, as well as in the interpretation of the findings (Booth, 2016). Furthermore, publication bias might have influenced the study, as research with null or negative findings is less likely to be published, which could have led to an overemphasis on the significance of mathematics learning difficulties or intervention strategies (Rothstein, Sutton, & Borenstein, 2005).

Thirdly, the generalizability of the findings may be limited due to the heterogeneity of the reviewed studies. The research designs, methodological approaches and contexts of the included articles varied considerably, which could have influenced the comparability and transferability of the findings to different settings, populations and educational systems (Gough, Oliver, & Thomas, 2017). Additionally, the focus on immigrant students in primary school may limit the applicability of the findings to other age groups and educational levels.

Despite these limitations, this systematic literature review and meta-synthesis provide valuable insights into the mathematics learning difficulties experienced by immigrant students learning in primary school, as well as the factors contributing to

these difficulties and the strategies that can effectively support their learning. Through the recognition of these constraints and their incorporation into the analysis of the results, this research has the potential to contribute to forthcoming studies and applications in the context of mathematics education for immigrant students.

5.6. Summary

This study presents a systematic literature review and meta-synthesis that sheds light on the distinct learning challenges encountered by immigrant pupils in the domain of mathematics education during their primary school years. Additionally, the research identifies the factors that contribute to these difficulties and effective approaches for facilitating their learning. For educators, legislators and school administrators who engage with immigrant students and want to improve their mathematics learning experiences, the study's findings have significant implications.

It is suggested that educators adopt a student-cantered approach to mathematics education that takes into consideration the unique requirements, backgrounds and experiences of immigrant students in order to alleviate the mathematics learning difficulties shown in this study. The proposed approach ought to integrate culturally responsive methods of instruction, including leveraging students' native languages and references to culture in the teaching of mathematics, alongside the utilisation of visual and enticing aids to augment students' comprehension of mathematical concepts.

Moreover, policymakers should prioritize the provision of targeted support and resources to schools with high populations of immigrant students, such as bilingual instructional materials, professional development for teachers and funding for additional academic and social support services. Subsequent research endeavours should explore the efficacy of various intervention approaches and their influence on the academic achievements of immigrant students in mathematics. Additionally, it is imperative to examine the potential interconnection of variables such as gender, socioeconomic status and linguistic proficiency in the context of learning challenges.

In order to promote educational equity and social justice, it is imperative to address the learning challenges in mathematics that are faced by primary school immigrant students. Through the implementation of efficacious support strategies and increased

investment in research pertaining to this area, it is plausible to enhance the academic accomplishments and welfare of immigrant students, thereby facilitating the establishment of more comprehensive and fair societies.

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