

Running head: CHALLENGES OF SCIENCE TEACHERS IN TEACHING THEIR SUBJECT
IN ENGLISH AT A NIS SCHOOL IN NORTHERN KAZAKHSTAN

**Challenges of Science Teachers in teaching their subjects in English at a NIS school in
northern Kazakhstan.**

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Submitted in partial fulfilment of the requirements for the degree of

Master of Science

in Educational Leadership

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Ethical Approval



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October 2020

Dear Askhat Nurmagambetov

This letter now confirms that your research project entitled: **“Challenges of Science Teachers in teaching their subjects in English at NIS school in northern Kazakhstan”** has been approved by the Graduate School of Education Ethics Committee of Nazarbayev University.

The changes recommended by the reviewer have been addressed and the proposed study now complies with all of the requirements of Nazarbayev University.

You may proceed with contacting your preferred research site and commencing your participant recruitment strategy.

Yours sincerely

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Abstract

Trilingual policy was introduced by the First president of Kazakhstan Nursultan Nazarbayev where he highlighted the importance of learning three languages (Kazakh, Russian and English). The implementation started from Nazarbayev Intellectual School developing NIS programme where according to this programme science subjects in high school should be taught in English. Moreover, this process is complicated, and teachers face different challenges while teaching science subjects in English.

This study investigates the challenges of science teachers in teaching their subject in English at NIS school in northern Kazakhstan. The purpose of this study is to identify challenges that science teachers faced during teaching in English. The study also aims to examine possible solutions from teachers' perspectives. The first research question is focused on the main challenges that science teachers face while teaching in English and the second research question relates to how they address these challenges. Four semi-structured interviews divided into two parts were conducted to answer the research questions.

The findings of the study present the main challenges in teaching science subject in English and how they cope with these challenges. Besides the importance of teachers' background and their preparedness in teaching their subject in English.

Keywords: teaching in English, teacher' challenges, curriculum reform, trilingual policy

Андатпа

Үштілділік саясатын алғаш рет Қазақстан Республикасының Тұңғыш Президенті Нұрсұлтан Назарбаев ұсынды, ол үш тілді (қазақ, орыс және ағылшын) оқып үйренудің маңыздылығын атап өтті. Бұл Назарбаев Зияткерлік мектептері ДББҰ әзірлеген NIS-бағдарламасын іске асырудан бастау алды. Осы бағдарламаға сәйкес орта мектепте жаратылыстану-математикалық бағыттағы пәндер ағылшын тілінде оқытылуы керек. Сонымен қатар, күрделі және ғылыми пәндерді ағылшын тілінде оқытуда мұғалімдер түрлі қиындықтарға тап болады.

Бұл зерттеуде Қазақстанның солтүстігіндегі Назарбаев Зияткерлік мектебінде жаратылыстану пәні мұғалімдерінің пәндерді ағылшын тілінде оқытудағы қиындықтары қарастырылады. Зерттеудің мақсаты жаратылыстану-математика пәнінің мұғалімдері ағылшын тілінде сабақ беру кезінде кездесетін мәселелерді анықтау болып табылады. Сонымен қатар мұғалімдердің көзқарасы бойынша мүмкін шешімдерді іздеуге бағытталған.

Зерттеудің алғашқы сұрағы жаратылыстану пәні мұғалімдерінің ағылшын тілінде сабақ беру кезінде кездесетін негізгі мәселелерге назар аударады, ал екінші - олардың осы мәселелерді қалай шешетіндігіне қатысты. Зерттеу сұрақтарына жауап беру үшін екі бөлікке бөлінген төрт жартылай құрылымдалған сұхбат жүргізілді.

Зерттеу нәтижесінде жаратылыстану ғылымдарын ағылшын тілінде оқытудағы негізгі қиындықтар және олармен қалай жұмыс жасайтындығы анықталды. Сонымен қатар, мұғалімдер тәжірибесінің маңыздылығы және олардың өз пәндерін ағылшын тілінде оқытуға дайындықтары талқыланды.

Түйінді сөздер: ағылшын тілінде оқыту, мұғалімдердің мәселелері, оқу бағдарламаларын реформалау, үштілді білім беру саясаты.

Аннотация

Политика трехязычия впервые была представлена Первым президентом Республики Казахстана Нурсултаном Назарбаевым, где он подчеркнул важность изучения трех языков (казахского, русского и английского). Реализация началась с реализации программы NIS-программе разработанная АОО «Назарбаев Интеллектуальные школы». Согласно данной программе, предметы естественно-математического цикла в старшей школе должны преподаваться на английском языке. Более того, этот процесс сложен, и учителя сталкиваются с различными проблемами при преподавании научных дисциплин на английском языке.

В этом исследовании исследуются проблемы учителей естественных математических наук при преподавании своих предметов на английском языке в Назарбаев Интеллектуальной школе на севере Казахстана. Цель данного исследования - выявить проблемы, с которыми сталкиваются учителя естественно-математических наук во время преподавания на английском языке. Исследование также направлено на изучение возможных решений с точки зрения учителей. Первый вопрос исследования сосредоточен на основных проблемах, с которыми сталкиваются учителя естественно-математических наук при обучении на английском языке, а второй вопрос исследования касается того, как они решают эти проблемы. Чтобы ответить на вопросы исследования, было проведено четыре полуструктурированных интервью, разделенных на две части.

Согласно результатам исследования были выявлены основные проблемы в преподавании естественных наук на английском языке и то, как они справляются с ними. Помимо этого обсуждена важность опыта учителей и их готовность преподавать свой предмет на английском языке.

Ключевые слова: обучение на английском, проблемы учителей, реформы учебного плана, политика трехязычного обучения.

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List of abbreviations

AEO	Nazarbayev Intellectual Schools
APTIS	All Purpose Ticket Issuing System
BIL	Bilim-Innovation Lyceums
EMI	English as a Medium of Instruction
CBI	Content-Based Instruction
CLIL	Content and Language Integrated Learning
IELTS	International English Language Testing System
MoES	Ministry of Education and Science
NIS	Nazarbayev Intellectual Schools
NUGSE	Nazarbayev University Graduate School of Education
SPED	State Program of Education Development

Chapter 1: Introduction

Kazakhstan has accepted modern trends in the language field. Therefore, Kazakhstan has adopted a policy of trilingual education. The government of Kazakhstan began to change the educational system that was created and implemented by the Soviet Union. The purpose of the State Program (2010) is to increase the competitiveness of education through high-quality and affordable education for the country's population (MoE, 2010). Respectively to the State Program for the Development of Education, the educational program should be improved relying on successful experience in school education of the world countries (Press service of the Prime Minister of the Republic of Kazakhstan, 2018) to enhance the competitive ability of future employees.

The study focuses on science subject teachers' challenges they face while teaching in English and the ways they overcome them. The study was conducted in one of NIS school in the North of Kazakhstan where science subjects in high school are taught in English.

This chapter provides a background to the study considering challenges of science teachers in teaching their subject in English at a NIS school in northern Kazakhstan. This chapter outlines the problem statement, the research purpose, research questions and background of the study.

1.1 Background of the study

1.1.1 Trilingual Policy

Trilingualism is an ability to use three languages, especially with equal or nearly equal fluency (Trilingualism,2020). It was highlighted that the usage of these languages should not be on the same level (Ytsma, 2001) rather to show the ability to express himself or herself and understand the language. Some countries implement trilingual policy and in present time where 178 countries are being implement this policy (Irsaliyev et al., 2017). Even though it does not mean that it happens successfully. Countries such as Finland, The

Netherlands, Switzerland, Spain (The Basque Country) and Luxembourg succeed in the delivering trilingual education. There are some reasons of successful implementation. These countries have experienced multilingual education. That's why the population is proficient in more than two languages. Finally, the languages in these countries are originated from the Latin that make them easier to learn. According to Irsaliyev et al. (2017) that languages in European countries are from same family or group. That is why some words and expressions similar and in some cases are identical. In addition, the salary of the teachers was mentioned there as it much higher than the average salary of teachers in Kazakhstan (Irsaliyev et al., 2017). Moreover, in case of Kazakhstan all three languages come from different groups. Kazakh language is a part of Turkic, Russian is Slavic and English is Germanic. Such situation was discussed by De Angelis (2007) that if languages are from different language family of group make trilingualism more complex. The ability of students to acquire all three languages depends on not only the relation to the family groups but also a cognitive predisposition to it (Cenoz & Jessner,2000). It was agreed that bilinguals are better in acquiring third language than monolinguals learning second language (Cenoz & Jessner,2000). Cenoz showed the evidence of the research where bilingual students (Spanish and Basque in their case) were more successful in learning English language than monolingual Spanish learning the same language.

In addition, research shows that the equity between these languages plays an important role in implementation of trilingual policy. The best example is a trilingual policy in Republic of China where the number of minority groups are bigger (Adamson & Feng,2014). It means that students are taught in their mother tongue and then other two languages are added. It demonstrates that while implementing the trilingual policy all these languages should be equal. Despite the implementation of trilingual policy faces difficulties, it is practicing and promoting around the world.

1.1.2 Kazakhstan's state language policy

The first President of Kazakhstan in his traditional speech in 2007 pointed out that there is no a limit of human life, and there is no end to education. He highlighted the importance of learning three languages as Kazakh language - the state language, Russian language - as a language of international communication and English - the language of successful integration into the global economy. Reforms in language policy focus on the need of trilingual policy. Trilingual policy was introduced by the First President Nursultan Nazarbayev in his address to people "New Kazakhstan in a new world" (Nazarbayev, 2007). This policy is reflected in number of programmes such as the State program of education development in the Republic of Kazakhstan for 2011-2020, the State program of languages development and functioning for 2011-2020, The Roadmap of trilingual education for 2015-2020, the law "On languages of the Republic of Kazakhstan". Based on the State Program of Languages Development and Functioning for 2011-2020 (MoES, 2011) the number of people who speak Kazakh would increase up to 95%, the number of Russian speakers increase by 90%, whereas the number of people who speak English rise to 20% in 2020 (MoES, 2011). It was written in this document that English should be taught not only as a foreign language but also should become language of instruction in all schools. It was stated that science subjects in high school will be taught in English. Few years later in 2015, Kazakhstan's Ministry of Education and Science introduced a Roadmap of Trilingual Education Development for 2015-2020. The major ideas of this programme was to implement trilingual policy at all levels of education within the support of common standards for language learning. as According to the Roadmap subjects in high school as sciences and math would be taught in English; in English; the history of Kazakhstan and geography in Kazakh; and world history in Russian (Moldagazinova, 2019). Several education researchers as Mehisto, Kambatyrova and Nurseitova (2014) have expressed challenges in

implementation of trilingual policy. These challenges refer to understanding of the policy and lack of knowledge about other countries experiments. Hence, the main challenges highlighted in the document is a need of science teacher who are able to teach in English. That is why teacher's training plays crucial role in implementation of the trilingual policy. According to the Minister of Education and Science (MOES) there is a need of 32 000 high school teachers for successful implementation of the policy. It was reported that 675 subject teachers were trained to teach in English by Nazarbayev University (Chemistry, Physics, Biology and Computer- Science), "Nazarbayev Intellectual Schools and JSC "Orleu"¹ prepare 69 teachers and KATEV² taught 18, 250 children and prepare 680 subject teachers, 84 teachers from regional specialized school for gifted children and 800 science teachers (Sagadiev, 2016). According to the State Programme of Education Development' (2010) the number of teachers who teach science subjects in English would be raise to 15% by 2020.

However, this plan was not succeeded and the dates of implementation of trilingual education. In accordance with the schedule, in the 2022-2023 academic year, it is planned to implement the English language of instruction at the Bilim-Innovation Lyceums, in international schools, gymnasiums, lyceums and multilingual schools, and for the next academic year - in 2023-2024 - the transition of all state schools is planned. The introduction of trilingual education will be carried out only at the choice of the educational organization on the basis of a collegial decision of the pedagogical council of the educational organization and the parent committee (The transition to trilingual education in schools of the Republic of Kazakhstan is planned to begin in 2023, n.d).

First Nazarbayev Intellectual Schools (NIS) were opened in 2008 and become testing site for the trilingual policy (AOE NIS 2013, 3). It should be mentioned that in some

¹ Republican institute for advancing leadership and scientific-pedagogical workers of the RK education system

² International Public Foundation

countries trilingual education is provided mostly in private elite schools while in Kazakhstan as it covers all types of schools in the country. NIS schools became as an experimental platform for implementing new educational reforms and share the experience with the mainstream schools (Shamshidinova, Ayubayeva, & Bridges, 2014). These schools provide teaching in three languages (AEO NIS 2013c). That is why to support the implementation of trilingual policy and provide guidance such as the Trilingual Education Policy for Nazarbayev Intellectual Schools, the Trilingual Implementation Guidelines for Nazarbayev Intellectual Schools, Core NIS Pedagogical Principles and Values, Integration of Content and Language: Guidance for Teachers, Team teaching: Overview were developed (Mehisto, 2015). It should be noted that despite the providing trilingual education NIS schools provide students the opportunity to learn second foreign language. Learning of an additional foreign language support student to improve a multilingual mindset, and intercultural competencies. Therefore, it will give students the opportunity in their further education to enter the world's best universities (Development Strategy, 2030).

Statement of the problem

Modern education requires not only knowledge in the chosen profession, but also knowledge of the international language. In this regard, educational reform is underway in Kazakhstan. The First President of Kazakhstan, Nazarbayev in his annual to the people of Kazakhstan announced the 2050 strategy on the importance of multilingual education for modern society (Nazarbayev, 2012). This message emphasizes the need for knowledge of the English language by the population of the country. Therefore, after this address to the people of the country, such programs as Road Map 2015 - 2020 and the State Program of Education Development (SPED) 2016 - 2019 (2016) were developed. These programs are aimed at developing trilingual education in the country. Even though these programs are

aimed at reforming the entire education system, it should be noted that one of the important points is trilingual education both in schools and in higher educational institutions.

The new education policy is an opportunity to strengthen the economic component of the country by training more competitive workers. For example, Lee (2012) noted that the increase in English proficiency directly affects the ability to collect knowledge of employees. As a result of this, the country's economy is growing. This process can be explained by the fact that most of the knowledge of humanity is created by all of humanity, and not just by one country or nation. Therefore, to get more knowledge, you need to be able to look for information on foreign sources. At the moment, English is the language of international communication. Therefore, a lot of research, development and just literature is translated into English. Based on this, it can be concluded that knowledge of the English language (in addition to the mother tongue) can provide access to more knowledge. However, to a greater extent, it is the theory and experience of other countries. It is necessary to analyze the situation on the spot, namely, what teachers think about the use of English in the policy of trilingual education. What difficulties have arisen with the introduction of teaching in English, subjects such as physics, chemistry, biology, and computer science in high school, and how they are solved.

Purpose of the Study

The purpose of this study is to identify challenges that science teachers faced during teaching in English at a private public partnerships school in the north part of Kazakhstan. Also, the study aims to identify how the science teachers address those problems. The study explores the background of the participants including their experience and courses they have visited to improve their language skills and teaching practice in using English to teach students in high school. Firstly, the study revealed the challenges science subject teachers experience in teaching their subjects in English. Secondly, it attempts to identify possible

solutions to those challenges. In addition, it presents the attitude of science subject teachers in applying English on their subject.

Research Questions

1. What challenges do science teachers in NIS school in northern part of Kazakhstan face while teaching in English?
2. How do they address those challenges?

Significance of The Study

This work is aimed at studying the problems of teachers of science subjects in high school of Kazakhstan, where teaching is carried out in English. Science subjects include physics, chemistry, biology and computer science. Despite the possible advantages that may arise with a deeper knowledge of the English language (access to more literature, more job opportunities, foreign practice), there are difficulties in introducing a policy of trilingual education. Some of the problems of this reform fall on the teachers. Therefore, studying the experience gained from these teachers can help in understanding the existing problems of educational reform. Identifying challenges teachers face while teaching science According to the subject in English plays a crucial role in implementing trilingual policy to all mainstream school of Kazakhstan as NIS schools were aimed to introduce it to all schools in Kazakhstan. The implementation of trilingual policy is already started. The first school Daryn schools (the network of lyceum schools for gifted children and talented youth of Kazakhstan), Nazarbayev Intellectual School (NIS) and Bilim-Innovation Lyceums (BIL) (Mehisto, Kambatyrova & Nurseitova, 2014; Irsaliyev et al., 2017b). As it was mentioned in the background section according to the Road map 2015-2020 (MoES, 2015) all mainstream school should start implementation of trilingual education by 2020-2021. Moreover, this implementation seems unrealistic as this programme will be realized in 2022-

2023 (The transition to trilingual education in schools of the Republic of Kazakhstan is planned to begin in 2023 (n.). Thus, this study is significant for policymakers as discussing the possible challenge will support them in successful implementation of trilingual policy to all schools around Kazakhstan. There is a need in investigating challenges and practices of teaching science subjects in English. The successful implementation depends on teachers' classroom practices (Oattes, Oostdam, Graaff, & Wilschut, 2018). Exploring the challenges, it is crucial to identify a current situation of using English in teaching science subjects in high school from different perspectives. The challenges and the ways of overcoming them support teachers to improve their teaching practice and make changes in methods in teaching their subject and developing English language. The understanding of these challenges is a foundation for teachers who will begin teaching their subject in English. It also provides information for schools to organize appropriate courses for developing science subject teachers' skills in not only in language but also in applying English in teaching the content of their subjects. This study also is crucial for teachers who are teaching or are going to teach science subjects in English as they already have possible solutions to the challenges they may face while teaching and prepare themselves. For me as an educator it is significant to understand how the challenges I also face while teaching could be solved and make some changes in my teaching practice.

Thesis outline

The thesis is consisted of six chapters, references, and appendices.

Chapter one includes background information about the research topic, the problem statement, the research questions and purpose, and the significance of the study.

Chapter two refers to the literature review discussed according to the purpose of the study including the role of teachers in curriculum reform, their attitude towards it and teachers' readiness. This chapter also discusses the Content and Language integrated

learning (CLIL), English as a medium of instructions and Content-based instructions as well as teachers' environment and support while curriculum reform, teachers' environment and support, professional burnout, and access to teaching resources.

Chapter three explains the methodology and design of the study. It describes the methods of data collection and data analysis. This chapter also includes ethical consideration discussions covering approval of the ethics NUGSE, information provided in Consent forms, terms of ensuring anonymity/confidentiality and the protection of the data.

Chapter four presents' findings of the study concerning the research questions. It provides detailed information on the key findings that was collected by conducting semi-structured interviews.

Chapter five discusses the findings that are interpreted in relation to the research questions.

The final chapter draws upon the entire thesis and includes a discussion of the implication of the findings, limitations of the study and recommendations for future research into this area.

Chapter Summary

This chapter discusses the background information of Trilingual and Kazakhstani state policies. The problem of the study was stated in accordance with the purpose of the study. The research questions were determining with the significance of the study. Thesis outline is presented in this chapter.

Chapter 2: Literature Review

This part is the most relevant. Although there are many studies, the research in challenges in teaching Science subject in English remains limited. The research made by Abdashim (2020) revealed that students should be divided into groups equally according to their performance. Even though the main issue in terminology and language that also can increase student's proficiency in English language. During his research teachers pointed out the necessity of improvement their English language that lead to their success in their teaching (Abdashim, 2020). However, there ongoing debates of using L1 (first language) during the lesson. This issue is discussed by many researchers in different countries. For instance, Aziz (2017) studied challenges while Teaching English in the Social Science Classroom and The results of his study showed that 70% of students are comfortable with delivering lessons in mixed language (first and English) and allow code-mixing in teaching. It was also found that there also bias regarding the ability of male or female students learn Science. As it was said before teachers needs courses on expanding their knowledge on CLIL approach and the way it implemented in other countries (Abdashim, 2020).

2.1 The role of the teacher in curriculum reforms

The teacher is the one who enforces the curriculum change in the school. It is the teacher who is the conductor of these changes. Therefore, the teacher must be at the center of all these changes (Ornstein and Hunkins, 2018). A change in the teachers' role can be an important factor in change. If previously the teacher was only a performer, then, as Pristley and Minty (2013, p. 6) write, now the teacher should become the one who develops the curriculum. According to the author, this may be the meaning of the changes in the curriculum.

However, this is not always the case. For example, Davis (2009) wrote about ignoring the teachers' point of view, despite the fact that teachers are the main executors in the

educational process. Moreover, Ibraimova (2017) and Gimranova (2018) write about the many difficulties teachers face when introducing a new education system. It often turns out that teachers have to follow new curriculum changes. In addition, as Davis (2009) writes, curriculum designers only guide teachers on curriculum implementation or subject teaching. An interesting point is the accountability of teachers after the introduction of changes in education. That can lead to professional burnout of teachers because they need to achieve specific results and a large amount of routine paperwork. This is the result of a top-down approach. To avoid such problems, Fullan (2015) advises giving more autonomy to teachers.

Pedagogical heritage is one of the problems of modern education. It happens that teachers use only specific teaching methods and do not want to change themselves (Fullan, 2017). Such teachers may ignore the new teaching methods and continue to use their old methods. It happens that starting to use something new and facing difficulties that need to be overcome, they return to their comfort zone. However, while in this zone, they do not learn anything. Plant (1987) investigated similar situations. According to him, the fear of failure, the lack of new information, and the fear of the unknown slow down the reform process.

2.2 Teachers' readiness

The willingness of teachers to apply a new curriculum or curriculum is an important factor in bringing about change in education. Change usually refers to transformation of something. As for organization it means that the current situation will be changes into another involving specific information. In most cases the change in organization is compulsory. The decision should be made by the administration that was emphasized by Inandi and Gilic (2016). However, these decisions should involves all the members of the organization (Lunenburg and Ornstein, 2004). Therefore, teachers must be prepared for these changes and have an opportunity to participate in discission of any changes. It was

stated that the participation of the employees in decision making process affect the satisfaction level with their job (Keung, 2008). Thus, the individual readiness for the change positively affect both themselves and their organization (Peach et al.,2005). Readiness for change is a three-dimensional concept that includes cognitive, emotion and intention. It could appear at different stages that makes the process of changes complicated (Bouckenooghe et al., 2009). Thus, the teachers must be provided with knowledge, skills, and teaching methods. Often all this is provided at various courses. Okello and Kagoire (1996) write that teachers must be prepared to apply change correctly in order to implement curriculum change successfully. Therefore, teacher training courses should help solve these problems. Do not forget that such courses must be well prepared. Teachers need to acquire appropriate skills to be prepared for the changes. For example, Ngussa, Waiswa and Makewa (2017) concluded that teachers were unprepared for educational change due to ineffective teacher courses. Based on this, I believe that well thought out and delivered courses are an important factor in the successful implementation of a new curriculum.

It is crucial to identify the readiness of all members of organization as it could be reflected in losing the opportunities and wasting resources, even worse in damaging the existed organization.

2.2.1 Content and Language Integrated Learning (CLIL)

One of the important components of the readiness of teachers in Kazakhstan is the knowledge of the English language by teachers teaching scientific subjects (physics, chemistry, biology, and computer science) in high school because these teachers must conduct their classes in English. There are several solutions for teaching science subjects. First, hire foreign teachers. Second, prepare a teaching staff fluent in English. The first option is not the best since these people can leave at any time. Kazakhstan will again be left without qualified personnel who speak English. Therefore, the second option is preferable.

Of course, it takes some time to prepare many people who can teach scientific subjects in English. Therefore, there are teaching methods that facilitate this task.

Content and Language Integrated Learning (CLIL) is "a dual-focused educational approach in which an additional language is used for the learning and teaching of both content and language" (Coyle, Hood, & Marsh, 2010, p. 1). In general, there are different definitions of the term. For example, Ball and Lindsay (2010) describe it as a means to learn (improve) a second language through teaching methods and practices. However, in the case of Kazakhstan, it is better to say a third language since the population of Kazakhstan generally knows two languages (Russian and Kazakh). In addition, we can say that the CLIL methodology is often associated with teaching in English (Fortanet-Gomez, 2013). Perhaps this is due to the spread of English throughout the world as an international language. In the case of Kazakhstan, CLIL is also often associated with teaching in English.

2.2.2 English as a Medium of Instruction (EMI) and Content-Based instruction (CBI)

There are other methods of teaching scientific subjects in the second (English) language. For example, English as a medium of instruction and Content-Based instruction.

One of the definitions of EMI was made by Dearden (2014, p.4): "the use of the English language to teach academic subjects in countries or jurisdictions where the first language (L1) of the majority of the population is not English". The first difference between CLIL and EMI is that the CLIL teaching methodology is suitable for learning in a second (non-native) language. When EMI focuses specifically on teaching the subject in English. Another difference is that CLIL focuses on learning both content and the language in general.

Another method of teaching a subject in a foreign language is Content-Based instruction. Lyster & Ballinger (2011, p.279) defined: "an instructional approach in which non-linguistic curricular content such as geography or science is taught to students through

the medium of a language that they are concurrently learning as an additional language". Judging by this definition, there is no significant difference between CLIL and CBI. For example, Cenoz (2015) also writes about the similarity of these methods. They both focus on both content and language.

2.3 Teachers' environment and support

The workplace environment is an essential factor for teachers to engage them in the implementation of the new curriculum fully. As Pearson and Moomaw (2005) write, the environment at work influences the performance of the team. The more positive the environment, the better the team works. The relationship between teacher - teacher and teacher - administration is an important factor in creating a friendly and generally positive atmosphere at work. However, one should not forget about such things as the school's financial condition, educational resources, and adequate teaching load for teachers. All of this is also part of a positive environment.

According to Xiao (2013), the principal is responsible for distributing the workload in the school. As a result, it affects job satisfaction and motivation of the whole school staff. For example, Yucel (2008) writes that help from school administrators has had a positive impact on teachers in the school and their success at work.

Another example of the impact of the environment on the implementation of a new curriculum is the 2010 Pristley study. The result of his research was that in one of the schools with high support of the school administration, high involvement of teachers, and their autonomy, they demonstrated effective work on the implementation of the new curriculum. In contrast, the second school, with low support from the school administration, low teacher involvement, and low autonomy, had poor results. The teachers did not even understand the meaning of the innovations (Pristley, 2010).

2.4 Professional Burnout

In many countries of the world, the reform of secondary education systems has been actively carried out for half a century. A general trend in school reforms across countries is the introduction of public accountability and the increased bureaucratic burden, which leads to increased levels of uncertainty, instability, and vulnerability that teachers experience in their workplace (Hall and McGinity, 2015; Ball, 2001). Studies of the professional activity and self-awareness of school teachers in different countries show that, despite all the national differences in education systems, most teachers feel pressure from the authorities, and teachers' workload is constantly increasing (Day, 2002). The transformations of the professional identity of teachers in connection with the ongoing transformations are, apparently, an unrelated topic for reformers. However, for the school, this is a crucial problem since the teacher's professional motivation, his commitment to the profession, job satisfaction, and the effectiveness of his work directly affect the achievements of students and their attitudes to learning (Hall and McGinity, 2015; Han, 2017; Tsui and Cheng, 1999).

There were about half a million teachers in Kazakhstan in 2019 (Sizdikbayev, 2019). These people perform an essential societal role: they carry out knowledge and value socialization of young people and thereby contribute to maintaining the integrity of society.

Today's teacher works in the conditions of the precarious of social and labor relations in Russia as a whole (Bobkov et al., 2015; Gasyukova, 2015; Toshchenko, 2015), which were superimposed on a series of economic crises. The phenomenon of precarious labor consists of the deformation of labor relations, expressed in the emergence of numerous groups of workers with infringed social and labor rights and a vulnerable, unreliable social position (Klimenko and Posukhova, 2017).

Similar problems occur in Kazakhstan as well. All this can lead to professional burnout. Burnout itself can occur in any profession.

Carson, Baumgartner, Matthews, and Tsouloupas, (2010) believe that burnout occurs due to emotional fatigue, achievement of too low a planned goal, and loss of personality. Teachers and not only burnout at work. A common manifestation of this is low motivation at work. Even it may come to indifferent attitude to work. In the case of teachers, this can affect their attitude towards students. They may be indifferent to the successes and failures of their students, which in turn can lead to reduced student achievement.

Embich (2001) argues that school administrators have a direct impact on potential teacher burnout. By remaining as a base of support from the school administration, teachers are more likely to burn out professionally. Possible reasons for burnout are lack of free time. It is speculated that burnout can result from high stress without sufficient rest time. An additional effect may be an aversion to the profession. Thus, people may leave the profession.

2.5 Access to teaching resources

Another factor in the success of educational reforms is the availability of teacher resources. Researchers such as Milner et al. (2012), Sargent (2011), Orafi and Borg (2009) have also talked about the importance of access to various kinds of resources when carrying out reforms. At the moment, one of the most critical resources is access to the Internet. However, do not forget about such things as specialized equipment for various subjects. In support of this, Johnson (2006) writes about the need for science teachers for specialized lesson equipment. Thus, teachers will be able to develop independently and introduce innovations in a quality manner. When we are talking about teaching in English the lesson should be planned according to the requirements. Special requirements are imposed on the selection of educational material and the development of tasks for it. Thus, the teacher is assigned the following tasks:

- While planning the materials for the lesson it is essential to select them according to the difficulty and the knowledge of students that should be suitable for students' needs. The appropriate number of tasks should be considered to make the material understandable and provide the opportunity for students to master the material.

- The chosen tasks should be related to the content of subject, motivate them and involve students into the learning process. While working with the tasks, students develop their skills through understanding, analysing and evaluating the main idea of the text.

- Tasks also should reflect some features of linguistic forms, do some practice exercises. While working with the tasks they learn to provide a feedback and do different types of assessment.

- The selection of materials should be aim at the stimulation and the development of students; creativity, develop their communication skills and writing skills in the foreign language.

- Students should be taught to cope with some difficulties related to the language, content and communication.

- The choice of teaching materials will depend on the course structure defined by the educational institution.

The proposed developments in conducting classes in physics, chemistry, biology and computer science are used in various methods: verbal, visual and practical.

All these methods are applied while planning the lesson dividing into several stages that are logically connected with each other. It includes: preparatory, introductory, analytical, applied and final. At each stage, one or another methodological technique can be used (depending on the competence of the teacher) (Azhigulova, 2017).

The lesson plan should be divided into several stages:

Preparatory stage

The preparatory stage involves a basic subject-language discussion (bilingual), motivating students to complete a particular task in the subject, and disclosing the algorithm of students' actions with the support of the teacher. By a preliminary subject-language conversation (bilingual), we understand as a two-language conversation (in the first language (Kazakh and Russian) and in English). This conversation is aimed at identifying how well students prepare a new type of activity and revealing to them the stages of bilingual actions (i.e., completing an assignment or presenting material in their native and English languages).

Introductory stage.

At the introductory stage, the student should follow the planned steps that includes receiving one or another subject information bilingually (that is, thematic information on physics, chemistry, biology and computer science, in their first and English languages) from the teacher or work independently to identify the different and credible sources; perceiving thematic information on a particular subject, in the first or English language (reading, speaking or listening).

Analytical stage

This stage includes processing the information received on the subject in the first or English language while implementing of the following stages:

- discussing of the received thematic information on the subject (what lexis, concepts and phrases are understandable to the student in the text and what words should be learnt by them to extend their vocabulary);
- work with a dictionary to find unknown lexical units and identify the grammatical structures and their appliance.
- all unknown lexical unite should be written in a subject-language dictionary on a particular subject (physics, chemistry, biology and computer science) which should include the translation, synonyms and definitions of all the words;

- it is allowed to have a translation from their first language (Kazakh / Russian) language into English or vice versa if necessary.

Applied stage

At the applied stage, the student uses the received thematic information on the subject for: subject-language communication (involving students in situations of communication in their first and foreign languages: discussing the information received, promoting and defending their argument, presentation and their explanation; in case students face some challenges it is allowed to continue their conversation using their first language; coping with written tasks (test, dictation, exercises, problem solving, etc.) or do some practice on the particular subject (laboratory classes, experimentation, design, modeling).

Final stage

The final stage involves a subject-language conversation, in which students should be involved in a thematic discussion in their native (Kazakh / Russian) and English languages), with indicators of communication results, with the inclusion of written and test papers, as well as mutual and self-reflection.

When conducting a lesson using the method of subject-language-integrated teaching, the teacher must:

- at the beginning of the their studying a subject in a foreign language, students can use their native language, but the teacher answers only in a foreign language;
- speak slowly, pronounce clearly;
- clearly stipulate the goals and expected results of the lesson;
- create a favorable environment for language learning;
- develop speech activity in reading, listening, speaking and writing;
- if the need arises, repeat words, sentences, phrases that are incomprehensible to students several times;

- use vocabulary in your speech that is comprehensible to students;
- work with thematic keywords;
- students should be motivated to use a foreign language in the lesson;
- use different types of activities to increase the motivation of students.

It is necessary to highlight the following forms of organizing educational activities in subject-language teaching: frontal, group, pair and individual work. The frontal form of educational work is implemented in a conversation, educational discussion, working with didactic cards in subjects (it is possible with the translation of thematic vocabulary), performing various exercises, solving various problems in a particular subject, conducting role-playing and didactic games in two languages: native (Kazakh / Russian) and English. With subject-language integrated learning, groups can be formed based on the language skills of students. In this case, assignments should be given at different levels: "A" for students with excellent level of English, "B" for students with good knowledge of English, and "C" for students with poor knowledge of English. At the same time, one group can include students with different levels of knowledge of physics, chemistry, biology and computer science, therefore the subject content of the tasks for all groups is the same. The formation of groups can be based on the level training of students in the subject. In this case, one group may include students with different language backgrounds, but with the same level of knowledge and skills in the subject (Azhibulova, 2017).

2.6 Teachers attitude toward curriculum reform

The very attitude of teachers towards reforms in both the education system and curriculum reforms is an important aspect of these reforms. Suppose Kazakhstan wants these new curriculum reforms to succeed. In that case, the very attitude of people, namely teachers, towards these reforms needs to be rebuilt. It is necessary to make people understand the need for these reforms to show new opportunities to lead these reforms. As Mackenzie and Lawler

(1948) wrote, success in changing a system will be successful when people are also affected. In addition, one can cite the statements of Ornstein and Hunkins (2018) about the success of the implementation of the new curriculum. They write that teachers' knowledge of the new curriculum and how to teach needs to be changed, but rather the teachers' mindset needs to be changed.

2.7 Chapter summary

This chapter reviewed related literature which is discusses the role of teachers' curriculum reform, their readiness and attitude to changes. As the implementation of the new policy is a complicated process which involves the environment. Thus, teachers play a crucial role in the policy implementation, their support is also investigated in this chapter. Due to curriculum reforms, it is a necessity of discussing the following approaches, such as Content and Language Integrated Learning, English as a Medium of Instruction and Content-based instruction. These approaches support educators to find about between teaching the content and language.

The chapter concluded by discussing by professional burnout and access educators to the teaching resources. The next chapter describes the methodology of the study.

Chapter 3: Methodology

3.1 Chapter overview

This chapter discusses the methodology of the study, site and participants selection, as well as data collection instrument, data collection process and data analysis. The chapter also includes ethical considerations of the study.

3.2 Research Design

The research project was designed to identify issues that science teachers faced during teaching in English as well as possible solutions to difficulties both from the teachers and from school administrators. The study investigates to answer research questions to achieve the purpose of the study. They are: What challenges do science teachers in NIS school in the northern part of Kazakhstan face while teaching in English? How do they address those challenges?

It was decided to use a qualitative method of research for this study, as this method is the most appropriate to answer the research questions. Creswell (2014) writes that this approach is suitable for researching and understanding problems. In general, my research is aimed at researching the teachers' perspectives on the implementation of trilingual education in one school in the northern part of Kazakhstan. In particular, the study explores the implementation of science subject teaching in English from the perspectives of the teachers. This methodology has been chosen as possible to gain in-depth understanding of the situation of one small group of teachers in one particular school, as written by Nisbet and Watt (as cited in Cohen, Manion & Morrison, 2007).

A case study method was chosen to conduct this study. Yin (2003) writes that a case study is appropriate when you need to answer the how and why questions. Also, he writes that the author chooses this method to cover contextual conditions, as they may have a relationship of the study area. My case fits these conditions. I have studied the problems of

Kazakhstani teachers in teaching scientific subjects in English. Eight interviews with four participants were planned for the study. The interviews collected data on the experiences, challenges, and practices of science teachers teaching in English. All interviews were conducted one-on-one.

3.3 Research site and sampling

The research was conducted at Nazarbayev Intellectual School (NIS) located in the northern part of Kazakhstan. NIS created a trilingual environment to help students build their linguistic competence (AEO NIS, 2013, p. 13). As it was opened in 2008 Nazarbayev Intellectual Schools are a testing site for applying new educational innovations and became the first schools in Kazakhstan implementing trilingual education (AOE NIS 2013, 3).

There are four subjects that are taught in English such as biology, chemistry, physics, and computer science. Students of 11th and 12th grades have an opportunity to choose two subjects out of four. That is why there is a necessity of using English by local (Kazakhstani) teachers while teaching science subjects in high school. It should be noted that local teachers are selected to teach high school students by their English language proficiency. These teachers are obligated to pass the exams and visit different language courses or courses to expand their knowledge of teaching their subject in English.

Purposeful sampling is a technique that is often used with limited resources with high efficiency. Creswell and Plano (2017), describe this method as selecting a group of individuals with good knowledge and experience in the chosen research area.

There are 130 teachers out of whom 46 teach physics, computer science, chemistry, and biology. These subjects are taught in English. From all these teachers four teachers were invited to participate in the research (1 from each of subjects Physics, Chemistry, Biology and Computer Science) To select the participants several criteria were set. Firstly, the participants should teach science (chemistry, physics and biology) and computer science –

you can call them science (physics, chemistry and biology) and computer science teachers. Secondly, it is crucial to have experience of teaching their subject in English. In particular, they participate in implementing trilingual education. Finally, it is a willing of teachers to participate in this research. All the participants were recruited on a voluntary basis. Also, all the participants who decided to take part in this research do not know who participated in the research.

The table below presents the details of the participants. It shows the number of participants and subject there are teaching. It also includes the range of their age and their experience: general experience and experience they have at NIS. Then it indicates their level of teaching excellence. Level of teaching excellence is a certain level of pedagogical activity. Passing the certification, a teacher receives the next level. This includes the following levels: trainee teacher, teacher moderator, teacher expert, teacher researcher and teacher master. From the table we can see that two of participants are teachers and others are teachers-moderators. In addition, all the interviewees have higher education certificate. The number of participants is enough to collect rich data as all of them were interviewed twice.

Table 1. Teachers background information

Participant	Subject	Age	Experience general	Experience NIS	Level of teaching excellence	Education
P1	Computer Science	27-38	12 years	4 years	Teacher moderator	Higher
P2	Physics	27-38	7 years	4 years	Teacher	Higher
P3	Chemistry	27-38	10 years	5 years	Teacher moderator	Higher

P4	Biology	27-	6 years	4 years	Teacher	Higher
		38				

Note. The name of the subject was used as pseudonyms.

According to the provided information about the participants all the teachers are teaching different subject that are taught in English. The age of them is varied from 27 to 38 years old. It is clearly seen that their experience is divided into two columns: general experience and their experience at NIS. This is essential as their experience at this school is on if the criteria to choose the participant into the research. In addition, all the participants are teachers or teacher moderators based on their level of teaching experience and have diploma of higher education. Thus, the participants meet the criteria of the study.

3.4 Data Collection Instruments and Procedures

Due to pandemic, all lessons are conducted online from April 2020. This a reason why all the interviews were conducted online as there were no information when school will return to full-time education. All the data was collected using the semi-structured interviews as a main instrument.

Interviews were conducted via Microsoft Teams as the main platform that is used to by NIS teachers while distance learning. This way of interviewing people is crucial as it helps with social distancing. Before conducting the interview, the questions were pilot tested in advance. These questions were pilot tested with a teacher of NIS from other cities. Then some changes were made according to their comments and recommendations. This is an important step for me before to be prepared for actual interview. As it was mentioned before all the interviews were conducted via Microsoft Teams. However, while planning the research it was proposed to have Skype interview or use other means of communication such as WhatsApp, Discord or Zoom. It also was discussed to have a one-on-one personal presence as an alternative. This was possible if the situation with Coronavirus changed.

Before interviewing the participants, it was important to be sure that all of them have no problem in internet connection,

The interview was recorded with the participants' permission only. Then all the recordings were transcribed for further analysis.

Overall, four teachers of NIS were interviewed. There were two interviews with each of the participant. In total, with four participants eight interviews were conducted. It was planned to take 40-50 minutes. However, some participants took more time for answering the questions. As it was noted there were two interviews with each participant. Therefore, the first part of the interview questions was focused on their background, experience and challenges they face while teaching in English. The second part of the interview was related to more specific questions such as difficulties and how do they cope with these challenges, as well as methods and tools, and changes in teaching in English (See Appendix B).

The process of interviewing teachers started with taken a permission from the school principal. He was provided with a support letter on behalf of NUGSE with explanation of the details of the research including the aim and objective of the study.

The recruitment process started in November 2020. The potential participants were invited to participate in the research and were selected by the set criteria. Then after their agreement all participants were acquainted with an informed consent form. Finally, time was negotiated with each participant.

When all data was collected, I was able to start analysis procedures. The data analysis's main aim is to identify the problems of science teachers faced while teaching in English and identify possible solutions. At first, all the interviews were transcribed (See Appendix C). I have not used any online tools to transcribe the recordings as takes time to find the appropriate tool and learn how to use it. The next step is to star coding (See Appendix C). The coding stage includes data observation, generation of initial codes,

identifying the themes, revision and naming them, then report writing (Braun & Clarke, 2006).

3.5 Ethical Considerations

This section is discussing the ethical considerations as it is essential and at the same time challenging part of the research. The process of taking ethical approval was divided into different stages. Firstly, it was necessarily to receive an approval at the school level. Research ethics form includes an outline of the project, context of the study, power and participation relations, information provided to the participants, their rights of withdrawal, informed consents, complaint procedure, and well-being, anonymity/confidentiality, data collection and data analysis procedure, data storage and protection, feedback, responsibilities, and reporting of research. Secondly, the ethics form was discussed with the study group to identify the main features of the ethics application and potential ethical issues that could appear while conducting the research. Finally, the supervisor checked the form, provided a feedback and after editing it was approved by him.

When the ethics approval from Ethics Committee of NUGSE was received the next step was to take an approval from the school principal from one NIS school where it was planned to conduct a research. However, it should be noted that if the research covered all twenty-one school of NIS it would be compulsory to receive an approval with the Research department of NIS. They would request information letter and consent forms, after their consideration they make a decision to approve or not the research (NIS Research, 2019). Research department is a Nazarbayev Intellectual School platform. This department's aim is to monitor and observe all the studies that are conducting in all these schools. After receiving the approval from the school principal, the information letter was sent to the participants via Outlook to invite them to take part in this research. It was aimed to inform invited teachers about the study and then send them a consent form for signature if they agree

with provided information. Consent forms includes the information on the research guaranteeing them anonymity, confidentiality and data protection for the participants (Appendix A). The participants had an opportunity to choose suitable language for them. The consent form was translated into three languages such as Kazakh, Russian, and English. This was made as the participants' first language differs. Some participants use Kazakh as a first language and others prefer Russian. They also had a choice to use English as a third language. Additionally, the consent from includes their rights to make them understand what is asked from them.

In terms of anonymity and confidentiality, the names and all identifiers of the participants were deleted. It is known only by a researcher. The names of the participants were replaced by the pseudonyms. The planed questions were not compulsory and in case the participants do not feel free to answer them they have a right to skip them without a pressure of the researcher. I have conducted all interviews via Microsoft Teams platform using my own login and password; all recordings are saved there. This computer is my personal and only me have an access to all information on them. All the data is saved and secured by a password om my computer and will be immediately destroyed and after finishing the study.

3.6 Chapter Summary

This chapter described the methodology of the study. A case study with semi structured interviews is used as an instrument to collect data, and the questions of the interview were discussed. The semi structured interviews were divided into two parts. Interviews were designed to collect data on the experience, challenges, and practices of science teachers teaching in English. The participants were chosen according to the criteria and includes one representative from each subject (physics, biology, chemistry, and computer science). This methodology is applied to gain in-depth understanding of the

situation in one particular school. The chapter also emphasised the ethics and the details of providing confidentiality/ anonymity of the participants. Additionally, the results of the pilot study provided, which led to making some changes in the questions for better understanding by the participants. Chapter four presents the main findings and discussion of the study is presented in the chapter five.

Chapter 4: Findings

4.1 Introduction

This chapter discusses the findings of the study that were gained through interviewing. The purpose of this chapter is to report the participants' responses and use them to address the research questions of the study. I will explain teachers' responses in connection with the following research questions:

RQ1: What challenges do science teachers in NIS school in northern part of Kazakhstan face while teaching in English?

RQ2: How do they address those challenges?

To respond to research questions of the study, semi-structured interviews were conducted. This process is discussed in the previous chapter Methodology. All the recordings were transcribed and coded. While coding the interviews the themes were identified and combined into categories to achieve the research purpose.

Thus, the outline of the findings chapter is outlined as following: first theme is *Trilingual Policy as a factor in changing teacher's teaching practice* which include *State and school policy and A-Level exams* discussions. Second is *Stakeholders' preparation to teaching in English while the implementation of trilingual education*. This includes the following categories as *science subject teachers' background, School support of stakeholders and relevance of preparation courses*. Third is *challenges in teaching science subjects which includes language barriers, explanation of science subjects' content in English and students' preparedness to study these subjects*. These themes are related to the research questions one. The final theme is *Attitude of science teachers to teaching in English* which discusses *the opinion of stakeholders and how do they cope with the discussed challenges*. This category answers the second research questions. At the end of the chapter the main findings and conclusions are provided.

4.2 Trilingual Policy as a factor in changing teacher's teaching practice

This section discusses the trilingual policy including the following subcategories: State and school policy and A- level exams.

4.2.1. State and school policy.

At the beginning of the interview the interviewees were asked about policy related to their teaching in English. The participants were asked *“Is it compulsory for student to study these subjects in English?”*. All the participants referred to the state policy as Participant 2 noted: *“the main policy of our state and in particular our school is trilingualism and the bias is made towards teaching in English”*. All the interviewees mentioned that teaching is compulsory according to the NIS program that it is used in our school as a main program. Despite all respondents replied that English is used in teaching science subjects in high school, however, they have an opportunity to switch to Kazakh or Russian that is needed for functional literacy development. Also, make the understanding of their subject clearer. In other words, if students face some difficulties while learning any of these subjects, teachers use their first language.

4.2.2. A-level exams

Two out of four of the respondents highlighted the importance of preparation for A-level exams while answering the same question *“Is it compulsory for student to study these subjects in English?”*. Talking about trilingual policy Physics teacher commented: *“... emphasis made towards teaching in English, taking into account the fact that students need to pass the A-level exam in English, it is clear that it is required...”*.

4.3 Stakeholders' preparation to teaching in English while the implementation of trilingual education

This section provides data on science teachers' background as important criterion to have a permission to teach in English. It also includes information about stakeholders' support and relevance of preparation courses.

4.3.1 Science subject teachers' background

Background information of participants were asked in the beginning of the interview. In the table 1 chapter Methodology the general information about the respondents is provided. It should be noted that all the participants work in this school from the opening. Despite they have different experience they are all teaching their subject in teaching about 3-4 years. For instance, Computer Science teacher commented that "*My overall experience is about 12 years, however, I started to teach in English only in 2018. Thus, it is about three years*". There was also a specific question "How many lessons in high school do you have per week?". The answers varied. The participants divided the number of hours they have in a week into two categories. The first is compulsory lessons and elective courses directed to prepare them for A-level exams. Two of the respondents mentioned that they have 12 hours per week, one respondent said that he has 18 per week and one more participant has 24 hours per week highlighting 3 hours of elective course per week.

As these participants teach science subject in English it was interesting to ask them about their education, especially having degrees related to English "*Are you educated only in your specialty or is there an education related to English?*". Three of them replied that they have higher education related only to their subject, where one respondent commented he has some subjects in English he was studied in the university. Though, one respondent explained that he finished school for talented and gifted with distinction certificate that is why he has high level of English.

In addition, all the participants passed the exam such as IELTS (International Exam Language Testing System) or APTIS (Accountancy and Passenger Ticket Issuing System)

to prove their knowledge in English and to have a permission to teach their subjects in English.

4.3.2. School support of stakeholders and relevance of preparation courses

According to the provided data from the respondents they have started teaching in English in 2018. It means that they should have taken courses to prepare for teaching. First question was related to English courses they had to support their language skills (*“Are there any English courses in your school?”*). All the respondents noted that every year they have English courses conducted by the English teachers. They commented at the beginning they were prepared to pass IELTS as this certificate is compulsory to have by science teachers who teach in English. They also mentioned that these courses were effective and English teachers’ support is essential in preparing for teaching in English. For instance, *“I think they are useful because without the support of a teacher who is fluent in the language, teaching becomes more difficult”*. However, some participants said that it was difficult for them to learn language working in groups and others noticed that they also spend much time in the self-development. One of the participants highlighted that *“...inner motivation plays the most important role...”*. Then, the participants emphasized that the format of their preparation has changed as each of them was allocated with mentors from English teachers. Mentoring is more efficient as they receive support based on their subject and their needs: *“I contact my mentor about once every two weeks. In terms of teaching my subject, mentor's lesson observation allows me to develop speaking skills, in particular, setting the correct pronunciation and creating error-free sentences”*. Other respondents also highlighted the importance of working with the mentor. These courses were organized by the school, however, they also mentioned the course provided by AEO (central governing office of NIS) outside the school. These courses were directed to prepare teachers for CLIL, but they were not developed their language skills. However, two of four participants replied that they

collaborated with teacher from other NIS schools in English and discussed different methods to improve their teaching of science subjects. Talking about AEO support all the interviewees have taken courses in the United Kingdom. It was Triple Science Education. Thus, they were immersed in the language environment. At the same time the respondents had an opportunity to visit school and observe the lesson as they gained useful information in teaching and how to adapt their methods in teaching their students.

It also should be mentioned that this year AEO has a collaboration with Bolashak program to send science subject teachers have an internship abroad: *“Already 3-4 candidates were chosen from each school. For example, there were chosen one Physics teacher to have an internship in the USA for six months and one more candidate from biology department will go to the United Kingdom for four months”* (Chemistry teacher).

Overall, all the participants agreed that they have different courses on AEO and School level. Moreover, AEO courses are more directed on CLIL courses rather than English courses: *“English courses are still an initiative of the school administration”* (Participant 2). In addition, some participants argued that it is more outer motivation with regular control, and it is not effective. Discussing the following question *“Do school administration or AEO support you in teaching in English?”* they also added that teachers who teach in English had a bonus payment: *“It was a good motivation as I could buy books for preparation”* (Biology teacher). However, according to changes in wages in 2020 teachers will receive bonus payment only if they have at least IELTS 6.5 certificate. Participant 4 noticed that *it would be more effective to have differentiated pay*.

4.4 Challenges in teaching science subjects

This sector discusses findings related to the issues teachers faces while teaching in English including language barriers and issues in teaching.

4.4.1. Language barriers

As the participants are teaching in English it is important to identify their challenges in using English language in teaching science subjects. All the participants explained that it was complicated to start teaching in English. Firstly, at the beginning while working in team teaching most of the work was done by an international teacher: *"I watched her teaching, lesson preparation and preparing handouts"*. International teachers were attracted to introduce international experience in teaching specialized disciplines, integrate Kazakhstani and international educational programs, taking into account the best experience accumulated by world pedagogical practice (For teachers, n.d.). All NIS schools work with international teachers. In 2011, the opening of new NIS school showed the need to search for additional strategic partners in hiring foreign teachers (at NIS the called international teachers) (Foreign teachers, n.d.). International teachers at NIS support local teachers in teaching science subjects in high school. They work in "Team Teaching". It is a project when two teachers work simultaneously in the class - a local and a foreign one, namely, the teaching of subjects is conducted by two teachers in the first and third languages of instruction. At the same time, this project was necessary at the initial stage of development of the Intellectual Schools, due to the lack of highly qualified local specialists. In the future, with an increase in the quality of the staff, foreign teachers will be replaced by local teachers of a high level of professionalism. Their official duties of have been significantly expanded due to additional educational and pastoral work. International teachers prepare students for the SAT and IELTS exams, teachers are actively involved in "Smart Thursdays" (an event held at the school. This is usually a meeting with a guest who can share their experiences with the students), "Young Specialist Schools", creative writing clubs, acting schools in English are held, and school newspapers are published in English (Foreign teachers, n.d.).

Secondly, some participants had a fear to speak in front of students that some of them have high level of proficiency in English: *"More often I just read the information on the*

slide. I was uncomfortable using spontaneous speech. And when I tried to explain something clumsily, it fettered me." (Biology teacher). However, Physics teacher argued that he was worrying about students' knowledge is not enough to fully understand both spoken and written speech. The participants emphasized that it was easier for them to teach their subject in English year by year as they gain the experience and take more responsibility during the lesson while working with international teacher. Thirdly, they started to collaborate with English teachers to discuss English level of students and identify gaps in their knowledge. Two of the participants noted that it is crucial to communicate with students and receive a feedback from them. Finally, while working online with students they lose an ability to communicate and develop their speaking skill. The lessons were shortened and became more as a lecture.

To sum up, all the respondents faced some challenges in teaching their subject in English. Moreover, they could overcome them with the help of international teachers. Some participants mentioned that it was crucial to visit courses abroad and to see the way people speak in English, to hear different accents: *"I realized that if I have an accent it is normal. It is more important to be understood by others"* (Biology teacher). It also motivated when you have a requirement to conduct lessons only in English.

4.4.2. Explanation of science subject content in English

Talking about issues respondents face during their teaching the one if this is connected to their specialty that is not related to teaching English or in English, then they have difficulties in explaining the material in English. Discussing this question, the interviewees noted that they are still struggling in using English (for example, pronunciation, word order, lack of vocabulary). In other words, they are not sure how well do they know English. However, half of the participants feel comfortable in using English in their teaching. Nevertheless, it becomes complicated to explain some of the topics. In this case they are

trying to use short sentences “*one sentence - one idea*” (Biology teacher). Another respondent tries to plan lessons where the questions and descriptors are prepared in advance, and the key moments of the lesson are already reflected in the worksheet (Computer Science teacher). As the participants already have an experience in teaching science subjects in English, they argued that it becomes easier for them to teach high school students English, emphasizing that used resources are available in English, they are much easier as compared to books in Kazakh or Russian.

4.4.3 Students’ preparedness to study science subjects in English

All the respondents expressed an awareness while started teaching their subjects in English. Those who work with grade 11 explained that students are struggling with perceiving the material in English especially understanding main terms of the subject: “all the same, brain reconstruction for the perception of material in English is given with some barrier, with a slight problem” (Physics Teacher). It was noted by all participants that perception of the materials in English is depends on the students’ level of English. Moreover, students perceive the materials well as they start learning science subject in grade 11 already and their have good knowledge in English. However, Participant 1 noted that the content of the subject causes some difficulties, and it is not connected to the language. At the same time Participant 4 argued that students who had no problems understanding biology in their native language, they had no problems understanding it in English. He also thinks that it becomes easier as all information in English is clearer, more concise, well-structured, and well-illustrated. Participant 3 explained that “*it could be difficult for students due to the sharp transition of the study of the subject from the first language to the third. Since up to grade 11, these subjects are studied in the first language. If children up to grade 11 were taught in Kazakh, then in grade 11 everything is already conducted in English.*”

All the respondents identified a tendency that usually students have lower results in term 1 and 2, but then they improve their results by the third term. Overall, students had difficulties with the way how to learn everything as it is a complicated process. In addition, a Physics teacher explained that students with IELTS score 6.0 and higher perceive the material easier in comparison with students whose score is lower. These students experience difficulties in learning this subject in English. As these teachers mostly work only with high school students, they need time to determine students' level of the language and knowledge of the subject. This happens because they never taught these students and time is needed to get to know with them.

4.5. How do teachers cope with challenges?

This section discusses how science subject teachers overcome the challenges they face during teaching in English

4.5.1 English language skills development

In discussion of Stakeholders' preparation to teaching in English sector it was explained that teachers receive a support from school in developing their language skills. Even though most of the participants stated that they spend more time learning English by their own. One of the respondents emphasized the role of writing recommendation letters. Recommendation letters play a crucial role in developing writing skill: *“Last year I was asked to write about 15-16 letters, and I have realized that the requirements for the writing are different from Russian language as sentences in English are short and clear. I have spent about 3 months to learn the structure. If earlier, after writing, I gave an international teacher to check it, then it was difficult for him to read and edit. But then I wrote 10 letters I have developed a skill in writing to present one idea as briefly and as concretely as possible. Then there appeared less and less errors in writing”* (Biology teacher).

4.5.2 Approaches to explain the content of science subjects in English

To support students in understanding the material in English teachers apply different methods to support them. The main approach that was mentioned by all responded is CLIL. It includes problem solving method where students try to solve mini problems, situations, and case study. Participant 2 emphasized the usage of Warm-up activities with accent on CLIL: *“this activity applies not only to consolidate students’ knowledge but also develop their English language skills”*. Coping with the challenges the usage of key words and illustration on the slides that will support in explain the topic. Talking about different tool the interviews that it is essential to prepare a presentation including all necessary materials taking into account the values of the school and organization. It usually provided with the worksheet. It was emphasized that different types of the task should be applied on the lesson. One of the participants added that while working in team teaching, they are preparing task to develop students speaking and writing skills related to different issues where students provide the arguments and justify their point of view. Additionally, it was emphasized to use and adapt appropriate materials for example books for exam preparation. It is important to choose credible materials and publishers for instance Cambridge University Press (Participant 4). Biology teacher noted that he bought some books to prepare students for passing A-level exams in England while participating Triple Science courses.

4.5.3 Students’ preparedness to study science subjects in English

Students’ preparedness to learn science subjects in English depends on their knowledge of English and their interest in studying these subjects. As it was already mentioned before the collaboration with English teachers is crucial as science subject teachers receive the information about students’ level of English. It includes the results of Summative assessment for Unit and each Term with detailed data on four language skills such as listening, reading, writing and speaking (Computer Science teacher). They also have an opportunity to receive recommendation on developing student’s language skills while

explaining the content of learnt subject. All the respondents agrees that it is crucial to create lesson plans with integrating materials and exercises for not only expand their knowledge but also develop their language skills. For example, testing their vocabulary by completing multiple choice questions (Biology teacher). Encourage students to take part in debated on a wide range of familiar and unfamiliar topics. It was also noted by the teacher of Chemistry that "...we can compare the results of graduates in 2018 where they were studied the same subjects in their first language and the results in 2019 who were the first graduates passing the exams in English. The results of students who passed the exam in 2019 were higher and they took sixth's place among twenty NIS Schools. Nowadays, the average score is about 10% higher than the average for chemistry in Kazakhstan among the NIS."

4.6. Attitude of science teachers to teaching in English

This section is related to the opinion of science teachers teaching in English. It also includes data on challenges they face and changes that occurred in their teaching.

4.6.1 The opinion of stakeholders about teaching their subject in English

All the respondents have a positive attitude towards teaching science subject in English. Firstly, it was noted that teaching the natural and mathematical cycle in English opens a wide range of opportunities for students as 30% of graduates has a chance to enter foreign universities. This knowledge will support them in their future studies where them will be easier to adapt not only in foreign universities but also in top Kazakhstani universities (Chemistry teacher). Secondly, even if they continue their education in Kazakhstan, they will have an opportunity to have an opportunity to study one or two semesters in foreign university as an exchange program. Thirdly, it is also open new opportunities for teachers to participate in lectures, visit seminars where the lectures are famous professors from around the world. It also includes broadening the horizons as teaching in English develops such skills as speaking, reading, and writing and provides an opportunity to improve their

mastering of this subject and become an expert in this field. The teachers who are teaching in English are in demand both in universities and in schools (Chemistry teacher). Then the respondent noted that another benefit in teaching English is availability of resources. All the actual information is in English *“using just the same English language we are in an up-to-date learning environment and we receive reliable and timely information”* (Computer Science teacher). Another respondent that he discusses new research related to the given topic and become easier to find news as it was time – consuming to read magazines so in present time it is enough to use a google search (Biology teacher). With the availability of resources terms have become more fixed, more established. It should be noted that one participant said that using English in his teaching changed his worldview of biology as a science: *if earlier, according to the old program, when I was studying, I perceived it as something clear, measurable, then I developed a more materialistic idea of biology itself as a science. Among other things, language proficiency and working in English open opportunities for a variety of tools such as statistical methods. It easier to understand them in English rather than in Russian.”* (Biology teacher).

List of the main findings

1. The education in English is conducted according to the State and School Policy. It includes Trilingual State Policy and NIS- program at all NIS schools. The learning science subject by the teachers is also required by the A-Level exams students pass in the grade 12.
2. All the teachers at high school whose subject is taught in English have subject specific higher education. Nevertheless, these teachers received IELTS or APTIS certificates.

3. There are two types of courses teachers participate in. The first type of course is related to the development of English language at school and CLIL courses provided by AEO abroad and in the country.
4. The main challenges in teaching Science Subject in English are related to some language barriers, the explanation of the content of their subject using English and students' preparedness to study science subjects.
5. To cope with the challenge respondents, apply different methods and tools. If the difficulties relate to the language, they ask support from the students. CLIL is a main method in teaching science subject including problem solving, case study, warm-up as support of their language. It was noted to prepare a detailed lesson plan with presentations and worksheets and prepare tasks for writing and speaking where students should provide and justify their points of view.
6. The respondents expressed their positive attitude towards teaching science subject in English. They shared the opportunities students have such as entering foreign universities, being able to continue their study in English and while studying in Kazakhstan take part into exchange programme. As for teachers they develop language skills and participate in lectures and seminars conducted by foreign lecturers. They emphasized the resources availability and broadening their horizons in teaching science subject.

The purpose of this chapter is to present findings of the research. The findings were divided into four categories. Firstly, Trilingual *Policy* was discussed including State *and school policy and A-Level exam*. Secondly, is *stakeholders' preparation to teaching in English* which was presented under the following categories: *science subject teachers' background, School support of stakeholders and relevance of preparation courses*. Thirdly, it presented *challenges in teaching science subjects which includes language barriers and*

issues in teaching. These themes are related to the research questions one. The final theme is *Attitude of science teachers to teaching in English* which discusses *the opinion of stakeholders, how do they cope with these challenges and changes in teaching*. This category answers the second research questions. Finally, the list of main findings is presented at the end of the chapter.

Chapter 5: Discussion

The previous chapter discussed the findings of the study based on the data analysis. This chapter discusses the explanations of the key findings. The purpose of this qualitative case study was to identify challenges of science teachers in teaching their subject in English at a NIS school in northern Kazakhstan. The research questions were: What challenges do science teachers in NIS school in northern part of Kazakhstan face while teaching in English? How do they address those challenges?

The discussion chapter is organized in the same vein as the finding's chapters reflecting the research questions. Firstly, *Trilingual Policy* was discussed including *State and school policy and A-Level exam*. Secondly, is *stakeholders' preparation to teaching in English* which was presented under the following categories: *science subject teachers' background, School support of stakeholders and relevance of preparation courses*. Thirdly, it presented *challenges in teaching science subjects which includes language barriers and issues in teaching*. These themes are related to the research questions one. The final theme is *Attitude of science teachers to teaching in English* which discusses *the opinion of stakeholders and how do they cope with these challenges*. Finally, it provides the answers to the research questions.

5.1 Discussion related to the research question 1 (What challenges do science teachers in NIS school in northern part of Kazakhstan face while teaching in English?)

The first three themes are related to the first research questions including discussion of trilingual policy, stakeholders' preparation to teaching in English and challenges in teaching science subjects.

Finding 1: State and school Policy. The composition and structure of the educational content of the Intellectual Schools are established based on the integration of the basic content of secondary education of the Republic of Kazakhstan with international

educational programs (NIS-programme, 2017). It refers that the educational content of the Intellectual Schools is implemented within the framework of trilingual education. The goal of trilingual education is to form a multilingual personality - a citizen of Kazakhstan who speaks three languages, is able to successfully conduct a dialogue in various fields of activity, values the culture of his people, understands and respects the culture of other peoples (NIS-programme, 2017). The discussion showed that the participants follow NIS programme that was applied in 2017 teaching high school students in English. This programme trilingual education in the Intellectual Schools by organizing the educational process in Kazakh, Russian and English (NIS-programme,2017). According to this programme upon completion of high school, students will have readiness to build an individual learning trajectory in accordance with their interests and abilities; skills of acquiring knowledge in Kazakh, Russian and English; and readiness to enter the leading national and foreign higher educational institutions. It means that to enter foreign higher educational institutions students pass A-level exams while graduating from NIS. Thus, graduates have the opportunity to enter higher education institutions without additional entrance exams and the Foundation's pre-university training course.

Finding 2: Teachers' background. The study of stakeholders' background demonstrated that all the teachers at high school whose subject is taught in English have subject specific higher education in their speciality. However, their certificate does not relate to English. Nevertheless, these teachers received IELTS or APTIS certificates. At the same time based on the changes made in August 2020 APTIS certificate teachers are allowed to have only IELTS / TOEFL (IBT), the words "APTIS B2 and higher" are removed (AEO NIS, 2020).

Finding 3: Teachers' preparation. Before starting teaching in English teachers should have high level of English. The importance of teachers' training was agreed by many

scholars (Breidbach & Viedbrock, 2012; Morton, 2012; Pistorio, 2009) and they should care about language needs (n (Lorenzo, Casal & Moore, 2010). That is why English language courses are provided by the school. Where at the first stage teachers develop their language skills and then they start to collaborate with English teacher as mentors to support science subject teachers' teaching. These teachers are also supported by AEO to improve their skills in teaching visiting courses in the UK named Triple Science. This year with collaboration with Bolashak programme, teachers have an opportunity to go abroad for internship. It is important to provide teachers with extensive teacher training (Pistorio, 2009) as inadequate training impact on students' progress development in the language and content learning and usage of insufficient materials (Morton, 2012). While the interview all the participants noted that it is essential to collaborate with their colleagues to exchange their experiences. It was mentioned by different researchers that it is crucial to participate in meetings, peer coaching, seminars as it is a good way to share their experience and gain new knowledge (Fernández & Halbach, 2011; Massler, 2012; Pawan & Craig, 2011).

Finding 4: Challenges in teaching science subject. While teaching in English their subject they face many challenges. The first challenges related to the usage of English. Most teacher at the beginning were scared to start conversation despite they shouldn't speak as native speakers taking into account language accuracy while teaching a content class (Wolff, 2007). There is also a struggle in finding a balance between teaching content and language. The also should be aware of choosing the right teaching materials. They adopt the materials and prepare the supporting materials by themselves. It was also noted that some students have struggles in language, confidence, materials complexity which impact students' motivation and their involvement (Ellis, 2003; Robinson, 2001; Skehan, 2001). The assessment tool and methods should be considered and well-planned (Banegas, 2014; Serragiotto, 2007).

5.2 Discussion related to the research question 2 (How do they address those challenges?)

This section discusses the findings related to methods the participants use to cope with the challenges expressing their attitude to teaching in English and changes they observed in teaching and learning.

Finding 5: Coping with the challenges. In order to deal with the challenge's teachers, face during their teaching science subjects in English. the Content and Language-Integrated Learning (CLIL) approach is applied in teaching high students. Teachers incorporates some strategies to not only develop student's language skills but also and most importantly extend students' knowledge in science subjects. The participants emphasized that detailed planning of the lesson is crucial for both content and linguistic learning. It was argued by Coonan (2007) that the activities in the classroom should involve students and create an environment where students engaged in participation by generating different linguistic output to understand terms and theories of the learnt subjects including tasks of analysis, synthesis, and evaluation. It is also important to use non-verbal strategies such as presentations, diagram, tables. In case teachers feel difficulties in explaining the material they can ask students to support them in explaining definitions and notions. This CLIL strategy was explained by Coonan (2007) in his research.

Finding 6: Attitude towards teaching science subject in English and opportunities both for teacher and students. Teaching science subject in English expressed positive view both for teachers and students. They see the opportunities for their students to be proficient in three languages. The research of Zharkynbekova, Akynova and Aimoldina (2013) showed that the participants were positive towards the trilingual education policy. As it was mentioned before students have an opportunity to enter foreign university without taking a foundation course. Even if studying in Kazakhstan they have an opportunity

to study abroad by participating in exchange programme. As for teachers there is a range of materials to teach science subjects. Being able to use English language they have an opportunity to apply and receive materials written for native speakers. It supports teachers to extend their knowledge in teaching their subject.

5.3 Summary

This chapter refers to findings and discussion of the collected data. Semi-structured interviews gave an opportunity to receive qualitative data. The data were organised concerning two research questions. All the findings were described in this chapter distinguishing the main findings and their discussion according to the research questions of the study.

Next Chapter concludes on the present study. Limitations of the research were identified, and recommendation for future research are given.

Chapter 6: Conclusion

This chapter summarises the study related to the challenges of science teachers in teaching their subject in English at a NIS school in northern Kazakhstan. The study was conducted with four science subject teachers enrolled in teaching their subject in English. The chapter is divided into four sections. The first section discusses the summary of the study. The second and third sections are related to the research questions. Finally, the last section presents the research limitations.

6.1 Summary of the study

Trilingual policy is a complicated process including preparation of teachers in starting teaching science subject in English. Therefore, NIS Schools became a platform for implementing trilingual policy to all school around Kazakhstan. These teachers face different challenges while teaching science subjects in English.

The purpose of the study is to determine the challenges that science teachers faced during teaching in English. The study also aims to examine possible solutions from teachers' perspectives. To achieve the purpose of the study the following research questions were set: (1) What challenges do science teachers in NIS school in northern part of Kazakhstan face while teaching in English? (2) How do they address those challenges?

The study used a case study and one-to-one semi-structured interviews were conducted with four participants. The interviews were divided into two parts and the data was collected on the experiences, challenges, and practices of science teachers teaching in English. This data was analysed applying thematic coding to determine the main findings. These findings were discussed related to the research questions.

To sum up, the study achieved the purpose of the study and the main challenges were identified, and possible solutions were suggested. It was also highlighted the importance of teachers' background and their preparedness to teach science subjects in English.

6.2 Research question 1 (What challenges do science teachers in NIS school in northern part of Kazakhstan face while teaching in English?)

Before identifying the challenges that teachers face while teaching in English it was stated that the main reason of starting teaching in English is the implementation of trilingual policy. Trilingual Policy is a state programme that is implementing to all school starting with NIS schools. It includes the development of NIS -program indicated that high school students are taught in English. Besides, it is a necessity to teach science subject in English as in high school students are to pass A-level exam to graduate from the school. The study shows that this change in teaching science subject is a challenge that teachers face with. The challenge is that teachers of science subjects are to change their teaching practice and develop new skills with learning English.

It should be noted that teachers' background is a challenge for the teachers as all of them have subject specific higher education in their speciality and it is not related to the English language. However, these teachers passed IELTS or APRTIS to prove their level of English that allow them to teach science subject in English. The extra preparation is needed to learn the language and receive an appropriate level to be allowed teach in English.

Therefore, to prepare teachers teach their subject in English teachers are to visit English courses conducted by the English teachers and these language courses are compulsory for science subject teachers organised by the school. These teachers are also supported by the AEO. They were sent to visit courses in Kazakhstan and abroad to extend their knowledge in teaching science subjects. This year due to collaboration with Bolashak programme, some teachers have an opportunity to go to internship in such countries as The USA and the UK. This challenge is not only related to the teachers but also to the school and AEO. It should be appropriately planned to choose courses to support teachers.

It was identified that the language is a one of the main challenges that teachers face as they face difficulties while introducing the material in English and at the beginning of their teaching they mostly related on the international teachers. There was complicated for teachers to find the balance in teaching content and language where they also should adopt the materials and encourage students to participate in the learning process.

6.2 Research question 1 (How do they address those challenges?)

After identifying the challenges, it was crucial to determine the ways to cope with them. Therefore, CLIL was defined as a main approach to deal with the discussed challenges. Teachers while teaching science subjects in English apply different strategies to develop student's language and extend their knowledge in their subject. The detailed planning is crucial in coping with the possible challenges. It should include non-verbal strategies that includes presentations, diagram, and tables.

While discussing the challenges and ways to solve them it was important to identify the attitude towards teaching in English as it affects the teaching process and involvement of teachers in implementing the trilingual policy. The collected data presents that they see the opportunities both for teachers and students. Teachers noted that they have access to the range of the material related to their subjects and have a possibility to apply materials written by the native speakers and improve their skill sin teaching science subjects. As for the students, teachers emphasized the importance of being proficient in three languages. They also have an opportunity to enter any university around the world without taking a foundation course and even if they study in Kazakhstan, they may participate in exchange programme.

It is recommended for the policymakers, AEO and school to choose appropriate courses related to the development of the language not only at the school level. As a preparation process of science subject teachers' courses related to the CLIL should be

conducted as it is a main approach of teaching these subjects in English. It supports teachers to teach and explain their subject in English. Talking about support it was mentioned that at the beginning of teaching science subject teachers are needed in support of international teachers. This is a necessity for local teachers to overcome the language barrier. It also crucial to have a collaboration with English teachers who act as mentors and provide support in case if science subject teachers face some challenges, especially in planning the lesson to include all the details.

6.3 Limitations and further research suggestions

This study was focused on science teachers' experience and was conducted in one Nazarbayev Intellectual School. As a result, some limitations were identified. The main limitation of this study is a small number of participants as one teacher from each subject was interviewed. Since a case study is used when conducting studies of small groups, and in my case four people from one school, the region of study is a limitation. In other words, the results of the study may only be suitable for this (northern) region of Kazakhstan. Therefore, in order to understand this problem throughout Kazakhstan, it would be good to conduct similar studies for all regions of the country.

In further research, the number of participants could be increased. Longitudinal study can be conducted covering not only teachers' but also students' experience in implementing the trilingual policy.

The research was conducted using semi-structured interviews. For further research with a larger cohort a questionnaire can be used together with the interviews. The usage of mix-methods will increase the validity of the study.

It would be interesting to do further research investigating the challenges of teaching subjects that are taught only in Kazakh (Geography, History of Kazakhstan, Economics and integrated Kazakh language with Kazakh literature) and taught only in Russian (World

History, Computer science in secondary school and integrated Russian language with Russian literature) other subjects are taught according to the students' first language.

In addition, it would be significant to research the challenges of teaching science subject in English in mainstream schools that are already started the implementation of trilingual policy.

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Appendices

Appendix A

INFORMED CONSENT FORM

Challenges of Science Teachers in teaching their subject in English at a NIS school in northern

Kazakhstan

I am a student of Master's Program in Educational Leadership at Graduate School of Education of Nazarbayev University (NUGSE). Your participation in the research is very important for this study.

DESCRIPTION: You are invited to participate in the **research** aimed to identify challenges of Science Teachers in teaching their subject in English in high grades (11-12). You will be asked to answer some questions during interviews and will be audiotaped. Audio files will be saved on the computer separately protected by password. After research is done all audiotapes and transcriptions will be destroyed.

TIME INVOLVEMENT: the interview will be held from 21th December 2020 to January 2021. Your participation will include participation in two interviews and each interview will take approximately 30 minutes.

RISKS AND BENEFITS: The researcher assures that he will keep all source materials secure and not to disclose personal information about the research participant. To ensure anonymity, all names will be replaced by pseudonyms and references to the participants' personal information will be removed. The researcher agrees to save all source materials on his personal computer protected by a password.

Firstly, the participants have an opportunity to reflect on their experience and improve their teaching practice. Secondly, the results of this study could be used to study their methods of teaching in English and apply it in the future. Finally, negative results could be used as useful experience for other teachers.

PARTICIPANT'S RIGHTS: If you have read this form and have decided to participate in this project, please understand your **participation is voluntary** and you have the **right to withdraw your consent or discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled**. You have the right to refuse to answer particular questions. The results of this research study may be presented at scientific or professional meetings or published in scientific journals.

CONTACT INFORMATION:

Questions: If you have any questions, concerns or complaints about this research, its procedures, risks and benefits, please contact me or my advisor:

A researcher: a MSc 2 year Educational Leadership program student, Askhat Nurmagambetov, askhat.nurmagambetov@nu.edu.kz

A research advisor: Assistant Professor, Nazarbayev University Graduate School of Education, Duishonkul Shamatov, duishonkul.shamatov@nu.edu.kz

Independent Contact: If you are not satisfied with how this study is being conducted, or if you have any concerns, complaints, or general questions about the research or your rights as a participant, please contact the NUGSE Research Committee to speak to someone independent of the

research team at +7 7172 709350. You can also write an email to the NUGSE Research Committee at gse@nu.edu.kz

Please sign this consent form if you agree to participate in this study.

- I have carefully read the information provided;
- I have been given full information regarding the purpose and procedures of the study;
- I am aware that my interview will be recorded;
- I understand how the data collected will be used, and that any confidential information will be seen only by the researchers and will not be revealed to anyone else;
- I understand that I am free to withdraw from the study at any time without giving a reason;
- With full knowledge of all foregoing, I agree, of my own free will, to participate in this study.

Signature: _____

Date: _____

The extra copy of this signed and dated consent form is for you to keep.

Appendix B

Questions for Interview One

1. What subject do you teach?
2. What is your teaching experience?
3. What is your experience in teaching your subject in English?
 - a. How many lessons do you have per week? (Grade 11-12)
 - b. Is it compulsory for student to study these subjects in English?
4. Are you educated only in your specialty or is there an education related to English?
5. Are there any English courses in your school?
 - a. Who have organized these courses?
 - b. How far these courses are affected?
6. Were there any English courses organized by school or AEO outside the school?
 - a. Have you visited that courses? If yes, were they useful for you?
7. Did you take any courses on your own?
 - a. If yes, could you say where?
8. Do school administration or AEO support you in teaching in English?

Questions for Interview Two

1. Do you have any difficulties in teaching English?
 - a. If yes, could you explain your answer?
2. If your specialty is not related to teaching English or in English, then you may have difficulties in explaining the material in English. How do cope with them?
3. What methods and tool do you use for teaching your students in English?
4. Natural science subjects are quite complex. And Kazakhstani students are new to study in English. How do they perceive the materials in non-native language?
5. Have you noticed a change in the students' learning who started to study your subject in English?

Appendix C

Какой предмет Вы ведёте?	Физика в старшей школе, 11 и 12 классы на английском языке	Учитель физики
Как много у Вас опыта работы по вашему предмету?	За последние 3 года нагрузка почти не изменная от 24 до 27 часов включая элективные часы. Помимо этого подготовка к урокам занимает примерно столько же – 20 -25 часов. И проверка домашнее задание различных лабораторных практических работ тоже порядка 20 часов. То есть в общей сложности на всю работу связанную с преподаванием и проверкой заданий и подготовкой уходит около 70 часов в неделю Общий стаж чуть более 7 лет. В него входит стаж воспитателя в интернате КТЛ, помимо этого преподаватель физики на казахском языке в школе №5 г.Костанай. Затем преподаватель физики на казахском языке с элективным курсом на английском языке в гимназии Мауленова и последние 4 года преподаватель физики в НИШ Костанай из них третий год на английском языке.	Еженедельная нагрузка 70 hrs per week 7 yrs experience 3 yrs Teach English
Как много у Вас опыта работы по вашему предмету на английском языке?	Официально 4 года. Формально, занимаясь помимо основной преподавательской деятельностью, т.е. включая подготовку детей к олимпиадам на английском языке, то 5 лет.	Опыт работы на английском языке 4 yrs of teaching (Eng)
а. Сколько уроков в неделю Вы проводите в старших классах? (11-12 классы)	В этом году 24 часа академ часа и 3 часа электива в 12 классах, направленных на подготовку к экзамену A level. Все преподаются на английском языке.	24+3 hrs in English
б. Есть ли обязательство обучать учеников в старших классах только на английском языке?	Поскольку основная политика нашего государства и в частности нашей школы является трехязычие, а уклон делается на преподавание с	Обязательное обучение на английском English medium

	<p>учётом того, что учащимся необходимо сдавать экзамен A level на английском языке, да, однозначно могу сказать, что требование такое предъявляется. Строго на английском языке.</p>	<p>1) State and school policy / trilingual A level exam</p>
<p>У вас образование только по вашей специальности или есть образование, связанное с английским языком?</p>	<p>Высшего образования нет. Никаких подтверждающих сертификатов нет. Есть курсы повышения квалификации за рубежом. 2016 год – Лондон, где они проходили на английском языке. Но, перед этим этапом у меня есть 5 лет обучения В КТЛ и аттестат с нагрудным знаком «Алтын Белгі», который показывает мой уровень английского языка. Помимо этого, уровень IELTS, который к сожалению уже истёк – 7.0.</p>	<p>English level 1) PDP in London 2) KTL in English 3) Алтын Белгі и IELTS 7.0</p>
<p>Проводятся/проводились ли курсы английского языка в вашей школе? а. Кто проводил/проводит эти курсы? б. Насколько полезные эти курсы?</p>	<p>Я работаю в НИШ фмн г.Костанай с 2016 года. Могу смело сказать следующее: 16-17 год курсы проводились активно. Как минимум 1 раз в неделю, иногда 2. Их проводили учителя английского языка, для всех учителей, которые планировались к переводу на преподавание на английском языке предметов ЕМЦ и не только, т.е. всех учителей в принципе задействовали в этих курсах. После этого, интенсивность курсов пошла на спад. В данный момент, в принципе, за всеми учителями кто преподаёт на английском языке предметы ЕМЦ, закреплены менторы, т.е. коллеги которые проводят методическую деятельность, оказывают помощь в преподавании на английском языке. Я к своему ментору обращаюсь где-то раз в две недели примерно. Мне немного сложно ответить на этот вопрос, по скольку у</p>	<p>English training (school-based) English teachers Mentors assigned role of English mentor PDP 60 out of 100</p>

	<p>меня уже был довольно высокий уровень английского языка. В целом, могу сказать следующее. Хорошо подобранный ментор под человека, даёт высокую эффективность именно в подготовке к экзамену IELTS. В плане преподавания своего специфичного предмета, посещение ментором предмета, позволяет развить навык говорения. Верного (правильного) произношения, пунктуации возможно, вот таких аспектов. Так что прямо курсы которые были массово, я бы оценил по 100 бальной шкале, где то на 60 баллов.</p>	
<p>Были ли организованы курсы английского языка от школы или АОО НИШ вне стен школы?</p>	<p>Говоря про Великобританию, это не были на самом деле курсы английского языка. Это были курсы Triple Science Integration. Ну то есть они были направлены на предмет и как раз таки ЕМЦ. Просто поскольку они (курсы) проводились в Великобритании, они проводились на английском языке. Целенаправленных курсов английского языка для учителей предметов ЕМЦ. Ну в принципе даже в нашем курсе был фрагмент CLIL, соответственно можно сказать, что это имело отношение именно к... как курс английского языка. Прямого курса не было, был только косвенный.</p>	<p>Triple science integration (England) CLIL</p>
<p>А сколько они длились примерно? а. Посещали ли Вы эти курсы? Если да, то были ли они полезны? Могли бы ли Вы оценить полезность этого курса?</p>	<p>Общая продолжительность курса составляла 10 учебных дней. Т.е. с понедельника по пятницу, ну или две недели пребывания в Великобритании. Полезность была колоссальная в двух аспектах. 1. Взаимодействие с коллегами из других НИШ республики на уровне английскомго языка. То есть сопоставить своё</p>	<p>Two weeks in UK English use with others UK teacher observation</p>

	<p>преподавание с их преподаванием</p> <p>2. Посещение зарубежной школы и возможность наблюдение предметов ЕМЦ именно в зарубежной школе. То как, там это преподаётся и преподносится, поскольку мы свою программу пытаемся адаптировать под их систему, соответственно это очень большой опыт.</p>	
<p>Проходили ли Вы курсы английского языка самостоятельно? Если да, то где?</p>	<p>Да. Курсы по подготовке к IELTS. В данный момент продолжаю их проходить, буквально на следующей недели планирую сдать IELTS. А это онлайн/офлайн курс? Это онлайн курс, он более самостоятельный. Там обратная связь очень минимальная и она компьютерезированная/автоматизированная, т.е. там автоматическая проверка. Платформа.</p>	<p>Онлайн курсы IELTS</p>
<p>Помогает ли администрация школы/АОО обучению на английском языке? Как именно?</p>	<p>Администрация (школы) распределила всех учителей, как я уже говорил ЕМЦ по менторам учителей английского языка. В плане АОО, организации курсов как таковых прямых нет, поэтому сказать что прямо идет помощь с АОО это маловероятно. Это скорее всё таки инициатива нашей администрации.</p>	<p>Оценка помощи администрации школы/АОО</p> <p>Administrator support</p> <ol style="list-style-type: none"> 1) Mentor appointment 2) Local school admin initiative
<p>Я слышал, что существует дополнительная оплата за преподавание на английском языке, если у Вас есть сертификат IELTS выше 6.5. Считаете ли Вы это помощью?</p>	<p>Как стимул, к тому чтобы развиваться в плане преподавания на английском языке, да, могу сказать. Однако, стоит отметить такой момент, что эта надбавка сейчас только в плане IELTS. Раньше был ещё экзамен APTIS. И вот, что хотелось бы отметить, это не сопоставимость, даже в плане международных стандартов результата APTIS и IELTS. Поскольку APTIS C, не</p>	<p>Bonus payment for English teaching</p> <p>Use IETLS vs APTIS?</p>

	соответствует IELTS 6.5, однако доплата велась даже за APTIS. Соответственно, считаю что нужно пересмотреть данный критерий, т.е. сам балл.	
Есть/был(и) страх, стеснение или барьер(ы) при преподавании на английском языке?	Опасение я бы сказал. Опасение только одно, это то что уровня английского языка у учащихся не хватит для того чтобы в полной мере понимать, как мою разговорную речь, так и письменную речь из учебников. Только вот такое опасение. За себя никаких опасений не испытываю.	Fear for students' lack of understanding

List of codes:

CODE 1. State and school policy.

CODE 2. A level exams.

CODE 3. Science subject teachers' background

CODE 4. School support of stakeholders and relevance of preparation courses

CODE 5. Language barriers

CODE 6. Explanation of science subject content in English

CODE 7. Students' preparedness to study science subjects in English

CODE 8. English language skills development

CODE 9. Approaches to explain the content of science subjects in English

CODE 10. Students' preparedness to study science subjects in English

CODE 11. The opinion of stakeholders about teaching their subject in English

Themes / categories

1. Trilingual Policy as a factor in changing teacher's teaching practice

CODE 1. State and school policy.

CODE 2. A level exams.

2. Stakeholders' preparation to teaching in English while the implementation of trilingual education.

CODE 3. Science subject teachers' background.

CODE 4. School support of stakeholders and relevance of preparation courses.

3. Challenges in teaching science subjects.

CODE 5. Language barriers.

CODE 6. Explanation of science subject content in English.

CODE 7. Students' preparedness to study science subjects in English.

4. How do teachers cope with challenges?

CODE 8. English language skills development.

CODE 9. Approaches to explain the content of science subjects in English.

CODE 10. Students' preparedness to study science subjects in English.

5. Attitude of science teachers to teaching in English.

CODE 11. The opinion of stakeholders about teaching their subject in English.