

Teachers' Perception of the Factors Influencing English Language Use in EMI Science Classroom: A Qualitative Study

Yerkhan Abduldayev¹, Talgat Zhussipbek², Yedil Nurymbetov³,
Akmarzhan Nogabayeva⁴

¹ Suleyman Demirel University, Almaty, Kazakhstan

E-mail: 212302002@stu.sdu.edu.kz

ORCID: <https://orcid.org/0000-0002-2503-8705>

² Karaganda University of the name of academician E.A. Buketov, Karagandy, Kazakhstan

E-mail: Zhussipbektz@buketov.edu.kz

ORCID: <https://orcid.org/0000-0002-6701-4701>

³ Suleyman Demirel University, Almaty, Kazakhstan

Email: yedilnurymbetov@gmail.com

ORCID ID: <https://orcid.org/0000-0003-0933-9425>

⁴ Suleyman Demirel University, Almaty, Kazakhstan

Email: a.nogabayeva@sdu.edu.kz

ORCID ID: <https://orcid.org/0000-0001-9121-7595>

DOI: 10.26907/esd.19.2.02

EDN: EHHGQM

Submitted: 6 July 2023; Accepted: 6 May 2024

Abstract

This article explores the factors that affect the extent of students' English language use in English-medium instruction (EMI) science classrooms. Semi-structured interviews were conducted with seven science teachers from private and public schools in Astana city, and thematic analysis was employed to analyze the qualitative data. The findings from the study highlight several factors that influence the extent of English language usage in science subjects, focusing specifically on the teacher factor. The teacher's language skills and methods affect students' English usage, with negative factors including Kazakh/Russian language use. The initial level of English is also important, such as the number of years of English language training and preparation for international exams. Understanding these findings can help inform strategies and interventions aimed at promoting and enhancing students' English language usage in science subjects, ultimately improving their comprehension and academic performance.

Keywords: English Medium Instruction (EMI), English language, teacher factors, teacher professional development, thematic analysis.

Восприятия учителей о факторах, влияющих на использование английского языка в классе по естественнонаучным предметам с английским языком как средством обучения (EMI): Качественное исследование

Ерхан Абдулдаев¹, Талгат Жусипбек², Едил Нурымбетов³, Акмаржан Ногайбаева⁴

¹ Университет имени Сулеймана Демиреля, Алматы, Казахстан

E-mail: 212302002@stu.sdu.edu.kz

ORCID: <https://orcid.org/0000-0002-2503-8705>

² Карагандинский университет им. академика Е.А. Букетова, Караганда, Казахстан

E-mail: Zhussipbektz@buketov.edu.kz

ORCID: <https://orcid.org/0000-0002-6701-4701>

³ Университет имени Сулеймана Демиреля, Алматы, Казахстан

Email: yedilnurymbetov@gmail.com

ORCID: <https://orcid.org/0000-0003-0933-9425>

⁴ Университет имени Сулеймана Демиреля, Алматы, Казахстан

Email: a.nogabayeva@sdu.edu.kz

ORCID: <https://orcid.org/0000-0001-9121-7595>

DOI: 10.26907/esd.19.2.02

EDN: EHHGQM

Дата поступления: 6 июля 2023; Дата принятия в печать: 6 мая 2024

Аннотация

Эта статья исследует факторы, влияющие на степень использования английского языка студентами в классах по естественным наукам, где используется английский язык как средство обучения (EMI). Были проведены полуструктурированные интервью с семью преподавателями естественных наук частных и государственных школ города Астаны, а для анализа качественных данных был использован тематический анализ. Результаты исследования выявили несколько факторов, которые влияют на степень использования английского языка в ходе изучения естественных наук, в том числе личностный фактор преподавателя. Уровень владения английским языком и методы его преподавания влияют на использование этого языка учащимися, негативным фактором можно считать использование в обучении казахского/русского языков. Важным является начальный уровень английского языка: количество лет изучения английского языка, подготовка к международным экзаменам и др. Эти результаты помогут разработке стратегий и корректив, направленных на совершенствование английского языка у всех, кто изучает естественные науки, что в конечном итоге улучшит их подготовку и академическую успеваемость.

Ключевые слова: английский язык как средство обучения (EMI), английский язык, фактор учителя, профессиональное развитие учителей, тематический анализ.

Introduction

English-medium instruction (EMI) or English-medium education is comparatively a new phenomenon (Hammou & Kesbi, 2023) in content delivery. And according to Pun et al. (2022) the use of EMI in teaching science subjects is becoming increasingly popular in some parts of the world. The Content and Language Integrated Learning

(CLIL) methodology is sometimes closely related to EMI. However, CLIL aims to develop both language proficiency and content knowledge, whereas EMI does not (necessarily) set language skills as an objective (Dearden, 2014). Thus, EMI in this work will be defined as following: ‘the use of the English language to teach academic subjects (other than English itself) in countries or jurisdictions where the first language of the majority of the population is not English’ (Macaro et al., 2018, p. 37). This substantially changed the role of the English language in education. While previously, in non-anglophone countries English was taught as a second language or a foreign language (ESL or EFL), recently in many educational settings its role quite quickly shifted to a language of instruction for science, mathematics, geography and medicine (Dearden, 2014). For the time being, it can be stated that EMI is a growing global phenomenon in all levels of education settings (Dearden, 2014).

Macaro (2018) demonstrated in his findings that out of 83 researches about EMI impact on language learning, only 4 (Aguilar & Munoz, 2014; Hu & Lei, 2014; Lin & Morrison, 2010; Rogier, 2012) applied national and international objective tests and 1 (Pessoa et al., 2014) created measurement instruments specifically for the research. Consequently, there is not enough empirical data about outcomes of EMI practice for students’ language proficiency or factors that affect the use of English in an EMI classroom (Macaro et al., 2018; Richards & Pun, 2023).

The very first EMI schools started their practice soon after Kazakhstan declared its independence, ‘prior to the launching of the trilingual education reform’ (Karabassova, 2020, p. 38). 15 years later the trilingual education programme, which promoted the use of three languages in Kazakhstan: Kazakh as the state language, Russian as the language of interethnic communication, and English as the language of integration into the global economy, was announced on state level (Nazarbayev, 2007). As a result, established in 2008, Nazarbayev Intellectual Schools (NIS) were nominated to be an ‘agent of change’ for trilingual transformation and educational innovation of the education system in Kazakhstan (Nazarbayev, 2010). As a next step of the policy, the Ministry of Education and Science (MoES) have piloted 153 schools to apply EMI in 2017. Although EMI’s transition to mainstream schools started in the 2018-2019 academic year, it was shortly paused in 2019 due to a lack of ‘well-thought-out plan’ and poorly addressing pedagogical peculiarities of trilingualism in the policy (Karabassova, 2020). Overall, there is an uneven development of EMI in secondary education in Kazakhstan. Thus, the aim of this study is to identify the factors that influence the extent of English use in EMI science classrooms. To identify these factors, this study aims to examine both teacher-related factors and factors influencing students through interviews with subject teachers. To achieve this aim, the following research questions have been addressed:

- What factors influence the English language use in EMI science classroom?
- How do teacher-related factors influence the extent of English language use in EMI science classrooms in secondary education in Kazakhstan?

Literature review

Factor of a teacher

EMI teachers play a key role in establishing use of English language in the classroom interaction. As Yip et al. (2003) and Lin & Morrison (2010) suggest, there is a big concern that EMI teachers affect negatively on students’ talking time, i.e. minimize student interaction, neglect students’ asking questions and group discussions. This consequently leads to, as it has been put by An et al. (2021, p. 28): ‘... a lack of substantial output from students.’ The same study intentionally addressed the issue of restricted English language skills among local teachers (Cho, 2012; Zacharias, 2013). This challenge, commonly

acknowledged in previous EMI literature, was investigated through Chinese school EMI programs' classroom interaction with native speaker teachers (An et al., 2021). However, the findings suggest that teacher dominance in the classroom with native speaker teachers exhibit similarity to the classroom interaction with non-native speaker teachers (Dalton-Puffer, 2007), both remaining teacher-centric. Thus, in an EMI context, the lack of classroom interaction results in limited chances for English learning (An et al., 2021). However, teachers' lack of language proficiency and pedagogical skills could be resolved by 'equipping them with innovative methods of teaching and advanced language and academic literacy skills' (Tajik et al., 2022, p. 109).

Another interesting research findings on the difference of Chinese and English medium instruction conducted by Yip et al. (2003) proposes that students in EMI classes spend less time on group discussions than students in CMI (Chinese medium instruction) classes. The study involved 100 secondary schools and 17616 student participants which were divided into 25 EMI schools and 75 CMI low ability, medium ability and high ability schools. Based on the research, the authors believe that using a straightforward teaching approach in EMI classes is suitable because students struggle with English and have difficulty understanding complex ideas and expressing themselves.

Teachers' over reliance on Target Language (TL), as it has been put by Polio and Duff (1994) in their research work investigating teachers' language use in university foreign language classrooms, might give students comforting understanding that L2 use could be avoided when communicating their thoughts. In the same vein Asif et al. (2018) think that, L1 use in the classroom tends to be unpredictable and unprincipled, thus without a solid reason to use L1, it should be considered pedagogically not justified.

Factors affecting students

Despite the fact that the current work focuses on use of English in EMI classroom settings, the work of Shvidko et al. (2015) shows factors that affect use of English outside the classroom from students' perspective. The data for the study was gathered from interviews (N=6) and focus group (N=42). The findings suggest that there are mainly four factors that influence language use outside the classroom. Sociocultural factor included such variables as peer pressure, fear of negative evaluation by compatriots, cultural communication pattern, need for cultural bonding; Linguistic factors: low language proficiency, translating habits, difference between English and student's L1; Individual factors: intensity of motivation, personality type; Affective factors: lack of confidence, stress from speaking English, fear of losing L1 identity when speaking English. Regarding language proficiency, Yip et al. (2007) come to the conclusion that students' low English level hinders their comprehension of scientific concepts, expressing their thoughts openly and ability to give a systematic argument and therefore these students gain low score tests (Rose et al., 2020). However, according to Rose and McKinley (2018) and Rose et al. (2020), in order to have better chances in EMI subjects students need to have an appropriate general English proficiency, because English language-related factors emerge as the most powerful indicators of achievement.

It is also evident that students who have been extensively exposed to English previously have better language skills and can demonstrate quality output at their studies, just like in the study of Trebits et al. (2022) where primary students were exposed to English and scored higher on phonological awareness tests than regular group students. Similarly, Lin and Morrison (2010) advocate that students, who extensively encounter English vocabulary through reading English books and receive instruction in the language, can adequately handle their university studies. While, a lack thereof, might bring challenges in comprehension of lectures and reading materials.

Methodology

The qualitative data obtained during the interviews was analyzed using thematic analysis. Thematic analysis is a highly effective and widely used method in pedagogy and social sciences for defining and exploring themes within qualitative data. Braun and Clarke (2006) assert that thematic analysis provides a systematic and flexible framework for organizing and interpreting data, allowing researchers to identify patterns, meanings, and relationships within their findings. This method enables a comprehensive understanding of complex phenomena in pedagogical research, facilitating the exploration of themes such as student engagement, teacher-student interactions, or instructional strategies.

Moreover, Nowell et al. (2017) emphasize that thematic analysis enhances the trustworthiness and credibility of research by adhering to rigorous analytical procedures. It ensures transparency in data interpretation and allows for the systematic development and refinement of themes through a process of coding, categorizing, and synthesizing data.

Overall, thematic analysis offers a robust and reliable approach for defining themes in pedagogy and social sciences, enabling researchers to uncover meaningful patterns and generate valuable insights that inform theory, practice, and policy in education and beyond.

The current methodology adheres to the Braun and Clarke's approaches. After familiarizing with the data 46 initial codes were defined, which was then grouped into 16 themes. In the final stage, two themes were named as Initial Knowledge of English and Teacher-related Factors.

Data collection

Data collection for this study involved conducting in-depth semi-structured interviews with 7 science teachers. These teachers voluntarily agreed to participate and signed consent forms after becoming acquainted with the interview questions. The interviews, conducted in March 2022, were chosen for their ability to capture rich and nuanced information. This approach allowed for a comprehensive exploration of the teachers' experiences, perspectives, and practices. By engaging with teachers from different school types, the study aimed to gather diverse perspectives. The semi-structured nature of the interviews provided a balance between predefined questions and open-ended exploration. The collected data offered valuable insights into the challenges, strategies, and innovative practices employed by science teachers in Astana city. Overall, the utilization of in-depth semi-structured interviews proved effective in collecting qualitative data and gaining a deep understanding of the research topic.

Participants

The participants in this research study consisted of seven science teachers specializing in various subjects from both private and public schools in Astana city. The selection criteria for the participants included their expertise in teaching science subjects and their willingness to participate in the study. The participants' characteristics are summarized in Table 1.

The participants were selected based on their subject expertise and their experience in teaching science subjects. Efforts were made to include a diverse range of subjects, including biology, physics, and chemistry. The participants consisted of both male and female teachers, with experience ranging from 5 to 15 years. Through engaging with science teachers from different school types in Astana city, this study aimed to capture diverse perspectives and experiences related to science education.

Table 1. Characteristics of Participants

Respondent	Subject	Gender	Experience	Type of school	Grades teaching	Position	Teaching Load
1	Biology	Female	9 years	Girls boarding school	9, 10, 11	teacher	24
2	Physics	Female	13 years	Girls boarding school	9, 10, 11	teacher	24
3	Physics	Male	5 years	Boys boarding school	9, 10, 11	teacher	20
4	Physics	Male	13 years	Boys boarding school	7, 8, 10, 11	teacher	23
5	Chemistry	Male	15 years	Mixed private school	8	vice-principal	8
6	Biology	Male	10 years	Mixed private school	7, 8, 9, 10	teacher	16
7	Biology	Female	8 years	Mixed private school	7, 8, 9	teacher	?

Results

1. Factor of a Teacher

The teacher factor is a significant determinant of whether students fully utilize English in science subjects. The actions taken by the teacher during lessons greatly impact students' comprehension of the subject matter, particularly in English-based subjects. The outcomes of the study indicate that the teacher factor plays a crucial role in addressing the research question. Through an examination of teachers' responses during interviews, it was discovered that this factor ranks among the foremost and primary influences. While teachers generally have a positive influence on students' extensive use of English in the classroom, there are instances where their impact can be negative. Consequently, the teacher factor is categorized into two groups: positive and negative. Given the prioritization of factors with positive effects, they are presented within a complex framework (Figure-1).

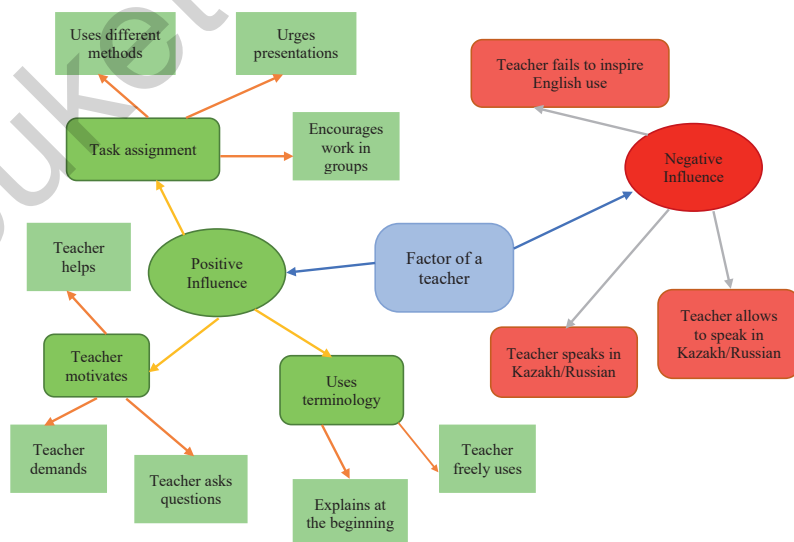


Figure 1. Detailed Information on Teacher's Positive and Negative Influence

1.1. Positively Affecting Factors

1.1.1. Task Assignment. Based on the results it was observed that a diverse range of tasks were assigned and implemented within the classroom to gauge the extent of students' English language usage. Consequently, it was discovered that teachers have the ability to enhance students' English language utilization through the provision of varied tasks. By engaging in real-world projects or everytime "we ask them to do the laboratory work in writing format" (Resp. 5, M) students tend to employ English more frequently during their lessons. Teachers explain what specifically they assign to students as following:

I will give them a project. Hmmm... or this new one... 'What do you think about the galaxy or the black hole?'. They make a project themselves when I ask them to write their thoughts about it. (Resp. 2, F)

Utilizing student presentations as a platform for delivering and defending their work in English proves to be an effective strategy in promoting English language usage, because "if we come to the presentation, the children will prepare the presentation" (Resp. 6, M). Remarkably, children demonstrate proficiency in completing these tasks successfully.

Children exhibit enhanced English Medium Instruction (EMI) skills when they collaborate in group projects and subsequently "all group works, and projects are presented in English" (Resp. 5, M). Engaging in group activities and defending them provides an effective environment for children to utilize EMI more effectively.

1.1.2. Teacher Motivates. Due to teachers employing various forms of encouragement, students demonstrate a higher frequency of English language usage. A primary factor contributing to the increased utilization of English both within and outside the classroom is the additional support and expectations placed upon students by their teachers. As it has been stated by Respondent 1 (F), teachers "encourage students to speak English by giving key words and supporting words". Teachers expressed their ability to generate student interest in the subject matter, thereby fostering a general eagerness to learn and use the English language. Additionally, teachers were found to assert expectations and demands upon their students in certain instances. For example Respondent 2 (F) tells the student to "speak in English, because the lesson is in English, or I [he] say that you [they] should try to answer in English during the lesson".

According to the teachers, providing assistance to students during in-class dialogues or lessons proves to be beneficial. They claimed that, "if you help [students], they will answer in English" (Resp. 1, F), i.e. by providing students with translations of unfamiliar words or listening to them attentively despite grammatical errors, can effectively enhance students' English language usage. A teacher at private school explains how he comforts students when they can only produce separate words as following:

Yes. That is, on the contrary, I welcome it, I say: "Don't worry too much." Then, I already know in my head what I want to hear, and if he says keywords like "scheme, Ohms law, resistors", I already understand, he mastered it. (Resp. 4, M)

In some cases, these processes take place by asking students questions in English, "for example, if you ask a question from the same text" (Resp. 1, F). But, sometimes teachers give translations of unknown words, so that "when the student comes to that word, he

should say it in Kazakh or Russian, or he can ask how it will be right there and replace it with the English word and continue the sentence" (Resp. 5, M).

1.1.3. Teacher Uses Terminology. The teachers' thorough understanding of specialized terminologies and their incorporation into daily classroom interactions plays a pivotal role in fostering increased usage of such terms by students. Respondent 1 (F) suggests that "if you help with a word, then the student continues in English", thus, ensuring more practice of English. Whenever students can not remember a keyword "I [teacher] suggest the terminology in English" (Resp. 3, M). Overall, a teacher's proficiency in terminology encourages "You [a teacher to] speak in English to them [students]" (Resp. 6, M).

When teachers provide comprehensive explanations of specific terminology at the outset of each lesson, students tend to utilize these terms more frequently and accurately. By thoroughly clarifying the meaning of new terminologies or related topics, teachers lay a solid foundation for students' understanding and usage. Respondent 2 (F) states that "when the lesson starts, we [teachers] will translate such and such terms, so that this terminology will be used".

1.2. Negatively Affecting Factors

1.2.1. Teacher Speaks and Allows to Speak in Kazakh and Russian. When the teacher does not exclusively conduct the entire lesson in English, it can contribute to a reduction in students' English language usage. In instances where the teacher incorporates words or terms in Kazakh or Russian during the lesson, it inadvertently provides an opportunity for students to utilize those languages. This creates a situation where students feel the need to respond in Kazakh or Russian, thereby leading to a free exchange of languages. Consequently, students may freely answer using languages other than English, as permitted by the teacher's language choices during the lesson. A biology teacher admits that she "also mix when I [she] don't understand. In some moments, I [she] don't stick to English, I [she] explain in Russian, Kazakh" (Resp. 7, F).

1.2.2. Teacher Fails to Inspire English Use. In certain cases, teachers show indifference towards students' responses in Kazakh/Russian during class discussions. This indicates that students may not fully utilize English for their subsequent answers. The findings suggest that students' answers, even when not in English, are accepted without any requirement for English language usage. One of the teachers explained it as follows: "In this school, Russian is often asked. 'Please explain in Russian' ask students" (Resp. 7, F). Another teacher explains his indifference to stick to English as follows:

Yes, simple, but understandable. This is what we need. I'm not an English teacher, but for me it was necessary for this child to give an answer, and no matter what the answer would be, this complex-subordinate or complex-composed sentence, it means nothing to me. (Resp. 6, M)

2. The Initial Knowledge of English

The initial level of English language proficiency emerged as another crucial factor identified in the study. Some students had attained a high level of proficiency in a foreign language in previous years, which positively influenced their ability to utilize English extensively in the current class.

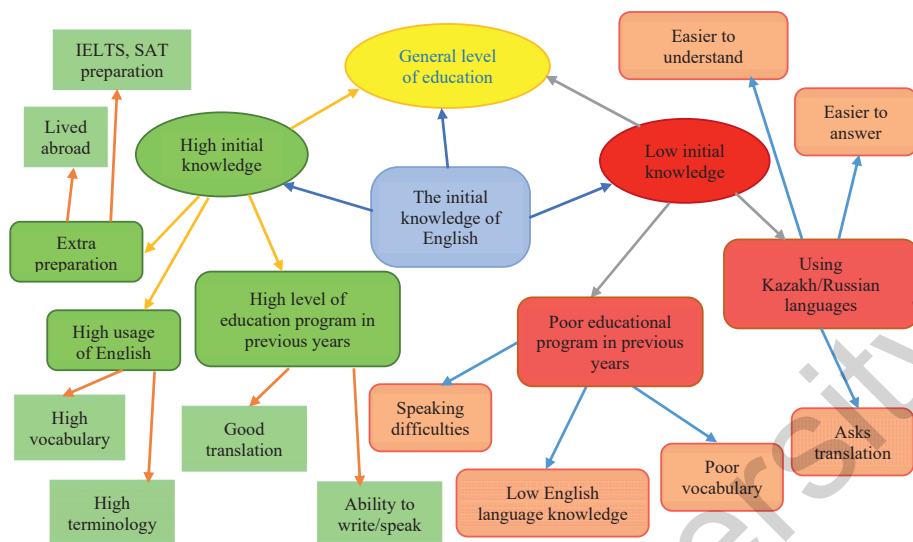


Figure 2. Positive and Negative Factors of being Exposed to English Earlier or Lack Thereof

2.1. Low Initial Knowledge

2.1.1. Poor Educational Program in Previous Years. Students exhibit varying levels of English language proficiency. This discrepancy in proficiency levels poses limitations on the extent of English language usage during lessons. It becomes apparent that students who had a limited understanding of English in previous years encounter difficulties when studying science subjects in English at higher grades. In certain cases, not only do different schools exhibit varying English proficiency levels, but even within a school, different classes may demonstrate discrepancies in English language skills. "Because, for example, in the 7-8th grade classes, maybe he did not pay attention to English properly, did not study" explains Respondent 1 (F). Another teacher suggests that language proficiency disproportion exists because of intentionally or unintentionally uneven division of students and this is how he explains it:

I think it depends on the class. If we look at 9A and 10B, for example, in 10B they are mostly... only 3-4 people are active. [In the 10s?] In the 10B. Yes, if you ask a question in English, but if you ask a question in Russian, most of them will be active. [What about the 9s?] Most of the 9A also express their thoughts freely in English. (Resp. 3, M)

In some cases, the reason for children's difficulty in speaking can be attributed to low initial language skills. For example, when students are asked questions, "it's very difficult for them to express" their thoughts. (Resp. 4, M). Other times, a student tries to speak in English, but then "adds words in Kazakh or Russian, and then it's not clear" (Resp. 6, M)

The limited foundational knowledge of basic English language also contributes to students' insufficient vocabulary, thus when "he can't express [his thoughts] completely, [he leans on] Can I speak in Kazakh?" method (Resp. 2, F). Students' lack of familiarity with essential words and phrases during lessons hinders their ability to actively participate and speak English in the classroom. "It often happens, for example, he can form a sentence, but when he doesn't know the exact word he wants to say, he can make a short pause, ask or continue in another language" (Resp. 5, M).

2.1.2. Using Kazakh and/or Russian Languages During the Lesson. Indeed, students' "responses in Kazakh or Russian" (Resp. 1, F) during the lesson is an indication of their

inability to use English. When students resort to using languages other than English, it can be attributed to various reasons. In some cases, it may be a temporary situation where students struggle to recall or articulate specific words or phrases in English. They may rely on their native language to express themselves more comfortably or to bridge gaps in their English language proficiency. *"That is, he [students] will try to answer, but briefly or sometimes uses [in Kazakh, Russian]" (Resp. 6, M).*

Students with limited proficiency in the English language often request translations of texts into their native language and express a desire to comprehend the topic in their native language. Consequently, they rely on teachers to provide translations. Thus, teachers are frequently asked to provide translations to bridge the language gap and facilitate comprehension for students who are still developing their English language skills. Students approach teachers *"using questions like: Teacher, how was it in English?" (Resp. 1, F).* According to Respondent 7 (F) many students in her school rely on Russian language and ask to explain in Russian.

Students often resort to using their mother language more frequently because it offers greater ease in understanding the lesson or topic at hand. However, this inclination towards the mother language can have a detrimental effect on their continued use and development of the English language. When the teacher delivers instructions or explanations in Kazakh or Russian, students tend to listen attentively, as it aligns with their native language proficiency. *"Some children think like this themselves, at first they say in Russian: and this is like this, this is because of this, this is this, good, and they begin to translate" (Resp. 6, M)*

2.2. High Initial Knowledge

2.2.1. Extra Preparation. According to Respondent 4 (M), students who have lived abroad indeed possess certain advantages over those who haven't had such experiences. Additionally, among students who haven't lived abroad, there is often a preference among those preparing for international exams such as IELTS, SAT, and others. The preparation process for these exams involves intensive English language practice, leading to significant improvement in their English proficiency. These students *"prepare for IELTS or SAT on their own or with someone" (Resp. 4, M)*

2.2.2. High Usage of English. The students' ability to incorporate subject-specific terminology and other essential vocabulary during the lesson demonstrates their readiness to use the English language extensively. Respondent 5 (M) tells that students *"know how to use a sentence, construct a sentence" and "when conceptual questions are asked [from students], they can explain [them]" (Resp. 4, M).*

2.2.3. High Level of Education Programs in Previous Years. Students who have been learning English for a longer period of time tend to benefit greatly. The knowledge and skills acquired during previous years of English language learning create a solid foundation for students to effectively engage with science lessons taught in English. The cumulative experience and exposure to the language over the years play a significant role in facilitating students' fluent and confident use of English in their academic pursuits.

Students who learned English in previous years can easily be recognised by their answers during the lessons. (Resp. 4, M)

2.3. General Level of Education. Students with good grades typically demonstrate strong English proficiency, while those with lower grades tend to have weaker language skills, impacting English use in the classroom. It is confirmed by the response of the

Respondent 1 (F) "for example, [if] the overall academic performance is low, then the English level is low".

High-achieving students effectively employ English in discussions, presentations, and assignments, promoting its extensive use. Their grades reflect their ability to comprehend and apply English skills in various academic contexts. Conversely, lower-performing students may struggle with English, hindering their engagement in English-based subjects. Challenges in comprehension and expression limit their language use during lessons.

Discussion

This study emphasizes the critical role of teachers in shaping students' English language use in EMI science classrooms. Although positive teacher factors such as effective instructional strategies, supportive classroom environments and teachers' appropriate language proficiency have been found as major factors for extensive use of English by students in this study, this aspect has not been reflected in EMI literature. However, negative factors like teachers' failure to motivate students to extensively use English correlates with findings of Yip et al., (2003) and Lin & Morrison (2010) which clearly state that students' talking time is minimized due to the neglect to students' asking questions and lack of group discussions. The findings of previous studies (An et al., 2021; Dalton-Puffer, 2007; Yip et al., 2003) suggest that teacher centered classroom interaction dominates many EMI classes which consequently leads to limited student interaction. However, the current research findings indicate that teachers rely more on Kazakh and Russian languages, which are teachers' and students' First Language (L1) and/or Second Language (L2) respectively or vice versa. Thus, students have limited chances to practice their English due to teachers' lack of English proficiency and/or due to students' limited language skills which urges teachers to switch to one of the students' L1. However, Polio and Duff (1994) believe that overuse of students L1 in the classroom might negatively affect students exposure to L2 by leaving them in a comfort zone which does not necessarily require use of L2. According to Asif et al. (2018), use of L1 is not always pedagogically ethical, because it is unsystematic and inconsistent.

Also, this study highlights the significant impact of students' initial knowledge and proficiency in English on their language use in EMI science classrooms. Arguments given by Trebits et al. (2022) and Lin and Morrison (2010) in their studies are consistent with the findings of this work, which emphasize importance of prior exposure to English to students' advancement in their studies and good level of comprehension of reading materials and instructions. Moreover, in line with the findings of Shvidko et al. (2015) and Yip et al., (2007), this study highlights connections between students' low proficiency in English and their hindrance in active classroom participation. On the contrary, higher levels of English proficiency enable students to utilize English extensively (Rose and McKinley, 2018; Rose et al., 2020). This also aligns with the findings of this study, where Respondent 1 suggested that students "can use those tasks at a sufficient level to express their thoughts". It can be forecasted that the reliance on native languages during the lesson by students also negatively affects their English exposure in a similar way as it does to teachers. Students with high-initial knowledge and exposure to English show a greater propensity for extensive language use. Effective EMI practices should consider students' initial proficiency, native language influence, and prior English education.

To optimize English language usage in science classrooms, a multifaceted approach is essential. First, educators should adopt a task-oriented methodology, integrating real-world projects, laboratory work, and group activities to boost students' language skills. Simultaneously, fostering teacher motivation through positive encouragement and consistent English Medium Instruction (EMI) creates an immersive learning atmosphere.

Complementing these efforts, targeted language support programs, early exposure initiatives, and differentiated instruction cater to diverse proficiency levels, ensuring comprehensive language development for all students in science education.

Limitations

It is important to acknowledge the limitations of this study, which focused on a specific context in Kazakhstan and involved a small sample size. Moreover, the current research does not consider students' perception in identifying the factors influencing English language use in EMI. Further research with larger and more diverse samples, as well as consideration of students' perception is warranted to validate and extend these findings.

Conclusion

In conclusion, this study highlights the critical role of teachers in shaping students' English language use in EMI science classrooms. Positive teacher factors, such as effective instructional strategies, teacher inspiration and supportive classroom environments, promote extensive language use, while negative factors like inadequate language proficiency and poor usage of English during lessons hinder it. Additionally, the study emphasizes the impact of students' initial knowledge and proficiency in English influencing language use. Understanding these findings can help inform strategies and interventions aimed at promoting and enhancing students' English language usage in science subjects, ultimately improving their comprehension and academic performance.

By implementing recommendations given above, educational institutions and stakeholders can enhance EMI practices, promote language integration, and foster students' language proficiency and academic success.

Conflict of interest

The authors declare that they have no conflict of interest regarding this study.

References

- Aguilar, M., & Muñoz, C. (2014). The effect of proficiency on CLIL benefits in Engineering students in Spain. *International Journal of Applied Linguistics*, 24(1), 1–18.
- An, J., Macaro, E., & Childs, A. (2021). Classroom interaction in EMI high schools: Do teachers who are native speakers of English make a difference?. *System*, 98, 102482. <https://doi.org/10.1016/j.system.2021.102482>
- Asif, S., Bashir, R., & Zafar, S. (2018). What Are the Factors Affecting the Use of English Language in English-Only Classrooms: Student's Perspectives in Pakistan. *English language teaching*, 11(6), 67–79.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101.
- Cho, D. W. (2012). English-medium Instruction in the university context of Korea: Tradeoff between teaching outcomes and media-initiated university ranking. *The Journal of Asia TEFL*, 9(4), 135–163.
- Dalton-Puffer, C. (2007). Discourse in content and language integrated learning (CLIL) classrooms. *Discourse in Content and Language Integrated Learning (CLIL) Classrooms*, 1–342.
- Dearden, J. (2014). *English as a medium of instruction—a growing global phenomenon*. British Council.
- Hammou, S. B., & Kesbi, A. (2023). English medium instruction (EMI) in Moroccan secondary schools: Science teachers' perception. *Studies in Second Language Learning and Teaching*, 13(2), 271–292.
- Hu, G., & Lei, J. (2014). English-medium instruction in Chinese higher education: A case study. *Higher Education*, 67, 551–567.

- Karabassova, L. (2020). Understanding trilingual education reform in Kazakhstan: Why is it stalled?. In D. Egéa (Ed.), *Education in Central Asia: A kaleidoscope of challenges and opportunities* (pp. 37–51). Springer Cham.
- Lin, L. H., & Morrison, B. (2010). The impact of the medium of instruction in Hong Kong secondary schools on tertiary students' vocabulary. *Journal of English for Academic Purposes*, 9(4), 255–266. <https://doi.org/10.1016/j.jeap.2010.09.002>
- Macaro, E., Curle, S., Pun, J., An, J., & Dearden, J. (2018). A systematic review of English medium instruction in higher education. *Language teaching*, 51(1), 36–76. <https://doi.org/10.1017/S0261444817000350>
- Nazarbayev, N. (2007, February 28). A new Kazakhstan in a new world: Address by the president of the Republic of Kazakhstan Mr. Nursultan Nazarbayev to the Republic of Kazakhstan. http://www.akorda.kz/ru/addresses/addresses_of_president/poslanie-prezidenta-respublikikazhastan-nazarbaeva-narodu-kazhastana-28-fevralya-2007-g.
- Nazarbayev, N. (2010, February). Ukaz Prezidenta Respubliki Kazakhstan [decree of the president of the RoK]. https://online.zakon.kz/document/?doc_id=30559730#pos=0;0
- Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic analysis: Striving to meet the trustworthiness criteria. *International Journal of Qualitative Methods*, 16(1). <https://doi.org/10.1177/1609406917733847>
- Pessoa, S., Miller, R. T., & Kaufer, D. (2014). Students' challenges and development in the transition to academic writing at an English-medium university in Qatar. *International Review of Applied Linguistics in Language Teaching*, 52(2), 127–156. <https://doi.org/10.1515/iral-2014-0006>
- Polio, C. G., & Duff, P. A. (1994). Teachers' language use in university foreign language classrooms: A qualitative analysis of English and target language alternation. *The Modern Language Journal*, 78(3), 313–326.
- Pun, J., Thomas, N., & Bowen, N. E. J. A. (2022). Questioning the sustainability of English-medium instruction policy in science classrooms: Teachers' and students' experiences at a Hong Kong secondary school. *Sustainability*, 14(4), 2168. <https://doi.org/10.3390/su14042168>
- Richards, J. C., & Pun, J. (2023). A typology of English-medium instruction. *RELC Journal*, 54(1), 216–240. <https://doi.org/10.1177/0033688220968584>
- Rogier, D. (2012). *The effects of English-medium instruction on language proficiency of students enrolled in higher education in the UAE* [Doctoral dissertation, University of Exeter, UK] <https://ore.exeter.ac.uk/repository/bitstream/handle/10036/4482/RogierD.pdf>
- Rose, H., Curle, S., Aizawa, I., & Thompson, G. (2020). What drives success in English medium taught courses? The interplay between language proficiency, academic skills, and motivation. *Studies in Higher Education*, 45(11), 2149–2161. <https://doi.org/10.1080/03075079.2019.1590690>
- Rose, H., & McKinley, J. (2018). Japan's English-medium instruction initiatives and the globalization of higher education. *Higher Education*, 75, 111–129. <https://doi.org/10.1007/s10734-017-0125-1>
- Shvidko, E., Evans, N. W., & Hartshorn, K. J. (2015). Factors affecting language use outside the ESL classroom: Student perspectives. *System*, 51, 11–27. <https://doi.org/10.1016/j.system.2015.03.006>
- Tajik, M. A., Akhmetova, G. Y., Filipova, L. N., Shamatov, D. A., & Zhunussova G. D. (2022). Students' struggles with EMI in Kazakhstani universities. *The Education and Science Journal*. 24(8), 95–115. <https://doi.org/10.17853/1994-5639-2022-8-95-115>
- Trebits, A., Koch, M. J., Ponto, K., Bruhn, A. C., Adler, M., & Kersten, K. (2022). Cognitive gains and socioeconomic status in early second language acquisition in immersion and EFL learning settings. *International Journal of Bilingual Education and Bilingualism*, 25(7), 2668–2681. <https://doi.org/10.1080/13670050.2021.1943307>
- Yip, D. Y., Coyle, D., & Tsang, W. K. (2007). Evaluation of the effects of the medium of instruction on science learning of Hong Kong secondary students: Instructional activities in science lessons. *Education Journal*, 35(2), 77–107.
- Yip, D. Y., Tsang, W. K., & Cheung, S. P. (2003). Evaluation of the Effects of Medium of Instruction on the Science Learning of Hong Kong Secondary Students: Performance on the Science Achievement Test. *Bilingual Research Journal*, 27(2), 295–331. <https://doi.org/10.1080/15235882.2003.10162808>
- Zacharias, N. T. (2013). Navigating through the English-medium-of-instruction policy: voices from the field. *Current Issues in Language Planning*, 14(1), 93–108. <https://doi.org/10.1080/14664208.2013.782797>