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Meta-Analysis of EMI in Kazakhstani Secondary Education: A Case of "Bilim-Innovation" Lyceums

Abstract. This study examines the implementation of English Medium Instruction (EMI) in the secondary education system of Kazakhstan, with a particular focus on the unique experience of Bilim-Innovation Lyceums (BILs). The study aims to analyze how BIL integrates EMI within the framework of the national trilingual education policy and to link global EMI research trends with local practice. Using a bibliometric analysis of 113 research articles from 81 Scopus-indexed scientific papers (2020-2024), the authors identify key trends, challenges, and developments in EMI adoption. The results show that BIL has become a leading platform for testing EMI-based teaching in mathematics, science, and other core subjects, reflecting broader global trends in internationalization and multilingual education. By linking bibliometric insights to real-world experiences of BILs, the study highlights successes and challenges, including teacher training, curriculum development, and policy alignment. Overall, this study contributes to understanding how EMI can be effectively implemented in the secondary education system of Kazakhstan and presents BIL as a model for integrating EMI into innovative learning environments.

Keywords: English Medium Instruction (EMI), secondary education, multilingual education, Bilim-Innovation Lyceums, teacher training.

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Қазақстандық орта білім берудегі EMI мета-анализі: «Bilim-Innovation» лицейлерінің мысалы

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Аңдатпа. Бұл зерттеу «Bilim-Innovation» Лицейлердің (BIL) бірегей тәжірибесіне ерекше назар аудара отырып, Қазақстанның орта білім беру жүйесінде English Medium Instruction (EMI) жүйесін енгізуді зерттейді. Зерттеу BIL ұлттық үштілді білім беру саясаты шеңберінде EMI-ді қалай біріктіретінін талдауға және әлемдік EMI зерттеу үрдістерін жергілікті тәжірибемен байланыстыруға бағытталған. Scopus-индекстелген 81 ғылыми еңбектен (2020–2024) алынған 113 зерттеу мақаласының библиометриялық талдауын пайдалана отырып, авторлар EMI қабылдаудағы негізгі тенденцияларды, қиындықтарды және дамуларды анықтайды. Нәтижелер BIL математика, жаратылыстану және басқа да негізгі пәндер бойынша EMI негізінде оқытуды сынау үшін жетекші платформаға айналғанын көрсетеді, бұл интернационалдандыру мен көптілді білім берудегі кеңірек жаһандық үрдістерді көрсетеді. Библиометриялық түсініктерді BIL нақты әлемдік тәжірибелерімен байланыстыра отырып, зерттеу мұғалімдерді оқытуды, оқу бағдарламаларын әзірлеуді және саясатты сәйкестендіруді қоса алғанда, жетістіктер мен қиындықтарды көрсетеді. Тұтастай алғанда, бұл зерттеу EMI-ны Қазақстанның орта білім беру жүйесіне қалай тиімді енгізуге болатынын түсінуге ықпал етеді және BIL-ді инновациялық оқу орталарына EMI интеграциясының үлгісі ретінде көрсетеді.

Кілт сөздер: English Medium Instruction (EMI), орта білім, көптілді білім беру, Bilim-Innovation лицейлері, мұғалімдердің біліктілігін арттыру.

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Метаанализ EMI в системе среднего образования Казахстана: случай лицеев «Bilim-Innovation»

Аннотация. В этом исследовании рассматривается внедрение обучения на английском языке (EMI) в систему среднего образования Казахстана, с особым акцентом на уникальный опыт лицеев «Bilim-Innovation» (BIL). Цель исследования – проанализировать, как BIL интегрирует EMI в рамках национальной политики трехъязычного образования, и связать глобальные тенденции исследований EMI с местной практикой. Используя библиометрический анализ 113 научных статей из 81 научной работы, индексированной в Scopus (2020–2024), авторы выявляют ключевые тенденции, проблемы и изменения в области внедрения EMI. Результаты показывают, что BIL стала ведущей платформой для тестирования обучения на основе EMI по математике, естественным наукам и другим основным предметам, отражая более широкие глобальные тенденции в области интернационализации и многоязычного образования. Связывая библиометрические данные с реальным опытом BIL, исследование выделяет успехи и проблемы, включая подготовку учителей, разработку учебных программ и согласование политики. В целом, данное исследование способствует пониманию того, как можно эффективно внедрить EMI в систему среднего образования Казахстана, и представляет BIL как модель интеграции EMI в инновационную образовательную среду.

Ключевые слова: инструкция на английском языке (EMI), среднее образование, многоязычное образование, лицеи Bilim-Innovation, подготовка учителей.

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Introduction

It is an interesting fact that despite having various mediums of instruction depending on the geographical location, context, the cultural and political background of the country, the English language from having a status of 'English as a foreign language (EFL)' has gained a new status quo of 'English medium instruction (EMI)'. This outstanding status has been dictated by the 'recent' developments in the world, such as globalisation, a paramount growth of information in the English language in all spheres of life (thus, making it very attractive for everyone) and English language-centred policies at different national and international levels. And yet, the vast majority of attention share of EMI is on higher education, with little interest in secondary education. This tendency has explicitly been formulated in Dearden's (2016) findings, which encountered EMI more in tertiary education than in secondary school, more in secondary school than in primary school and more in the private sector than in the public sector [1].

The integration of EMI into education systems has raised pressing questions about inclusive education. Kazakhstan is internationalising its education system with policies aimed at expanding English-medium education (EMI) and promoting inclusive practices to ensure equal access for all students. According to the World Bank Group (2025), inclusive education is about creating systems and environments that enable all students to have equal access to education and learning [2]. UNICEF (2025) identifies that inclusive education is the most effective way to ensure that all children have a fair chance to attend school and acquire and develop the skills they need in real life [3]. The World Bank Group (2025) states that despite the global focus on inclusive education, many marginalised students, especially in low- and middle-income countries, are falling behind and not learning as much as they should [2].

However, policy ambition does not always translate into practice. Makoelle & Burmistrova (2021) describe Kazakhstan's legal environment as aspirational, rather than fully implemented; this study highlights significant gaps in teacher training for inclusive education in teacher education institutions in Kazakhstan [4]. Despite the growing international focus on inclusive practice, pedagogical universities and colleges in Kazakhstan lack a unified and strategic approach to preparing future teachers to work in inclusive classrooms. The lack of specific courses, practical exposure, and structured curricula on inclusion significantly limits the readiness of graduates to meet the diverse needs of learners. Let us consider EMI in Kazakhstan, the Introduction of EMI in secondary schools of Kazakhstan, 'Bilim-Innovation' lyceums / 'Bilim-Innovation' International Social Foundation, and EMI textbooks.

In Kazakhstan, EMI has been strategically implemented through the trilingual education policy and has been introduced in select settings such as Kazakh-Turkish Lyceums (KTL/BIL) and Nazarbayev Intellectual Schools (NISS). However, despite strong policy support, persistent gaps remain in the inclusion and accessibility of EMI in classrooms, particularly in general secondary schools. This study examines recent research trends on EMI in Kazakhstan in the broader context of international and inclusive education and seeks ways to address this gap by studying current trends, challenges, and future research directions.

Research Objectives and Context. The main objective of this study is to examine how Education-Innovation Lyceums (BILs) have adopted and implemented English Medium Instruction (EMI) within the broader context of Kazakhstan's national trilingual education policy. While previous studies have examined EMI at a macro level in Kazakhstani secondary schools, limited research has focused on the unique practices of BILs. These lyceums, run by the international social foundation Bilim-Innovation, play a key role in pioneering innovative pedagogical approaches, including the early introduction of EMI in science and mathematics. By examining BIL's EMI practice, this study aims to uncover strategies, achievements and challenges associated with integrating English as the medium of instruction in elite educational organizations.

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The relationship between EMI Research and BIL. A bibliometric analysis of 113 Scopus-indexed publications provides insights into global and regional trends in the field of EMI; however, the practical implications of these findings become clearer when examined through the lens of BIL's practice. By comparing international research on EMI with local policies, textbooks, and teaching practices used in BIL, this study makes direct connections between scholarly discussions and the implementation of findings. The findings highlight that the BIL approach reflects global trends toward internationalization and inclusiveness in education, while also highlighting challenges specific to Kazakhstan, such as teacher training, curriculum alignment, and balancing multilingual goals. This connection presents BIL as a model for understanding how EMI can be effectively applied in secondary education that aligns with Kazakhstan's educational modernization agenda.

Literature review

EMI in Kazakhstan

As in many other non-English-speaking and non-anglophone countries, EMI in Kazakhstan is present in both school and tertiary levels of education. However, there is no specific agreed-upon definition of EMI locally, neither at the university level nor in schools where it is practised. This is because the EMI as a phenomenon is 'comparatively' new in education internationally, and therefore, there is a lack of commonality when it comes to its definition.

In Kazakhstan, EMI developed gradually, with very few universities capable of providing education in English in 1992. There was no significant change in the number of programs and universities until 2010 [5]. However, becoming part of Bologna's three-cycle system in 2010 has made a huge impact on the growth of Bachelor's, Master's and PhD programs conducted in English in Kazakhstan [6]. In five year-time the number of universities which started to provide EMI has risen for 75%, reaching 70 in 2020 [5]. Apart from Higher Education Institutions (HEI), Kazakh-Turkish high schools, which were founded in 1992, have been using EMI in science, mathematics and ICT subjects. Although this experience did not get sufficient attention from researchers, the practice of applying EMI in Kazakh-Turkish lyceums has inevitably brought to the market a certain amount of school graduates who could pursue their education in EMI universities like KIMEP, SDU, KBTU in Kazakhstan or study abroad with state funded Bolashak International Scholarship Programme. Many KTL graduates dominated in above-mentioned universities and the programme until state designated 'Daryn' schools started to practice trilingual policy in 2007 and the establishment of Nazarbayev Intellectual Schools (NIS) in 2008 [7]. Currently, EMI in Kazakhstan is present and growing both in school and tertiary education due to the internationalization of education and support from the state with its trilingual policy, and last but not least, because these two levels of education create a 'favourable environment' for each other.

Research findings suggest that EMI is essential for successful implementation in inclusive settings. For example, Jiang et al. (2019) examined the experiences and perceptions of teachers implementing EMI in China, examining the complex interplay between their teaching methods and students' learning motivations; this study highlights the need for teachers to adapt their teaching strategies to meet the diverse needs of students, especially in multilingual classrooms [8]. EMI, in conjunction with inclusive education, has demonstrated the potential for promoting multilingualism and global education in a broader context, such as opportunities and language barriers, but also challenges, such as ensuring that students from disadvantaged backgrounds do not suffer from the same benefits [9]. Inclusive education is a relatively new concept in teacher training in Kazakhstan. Makoelle & Burmistrova (2021) note that while the government recognises the importance of inclusive teacher education, most university programs do not offer significant modules on inclusive environments [4, p. 452]. Most teachers enter classrooms without the skills to adapt curricula or meet the diverse needs of students. While these initiatives have advanced EMI implementation,

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questions of inclusivity remain underexplored, for instance, whether EMI opportunities are equally accessible to students from different socioeconomic or linguistic backgrounds.

Introduction of EMI in secondary schools of Kazakhstan

As the first country which acknowledged the independence of Kazakhstan, Turkey was the first to bring a modern, Western oriented education system instead of the Soviet education system with its first Kazakh-Turkish schools (Bilim-Innovation lyceum after rebranding in 2017) opening up in 1992 in Almaty (capital city of the country then) and Kokshetau. Currently, 'Bilim-Innovation' International Social Foundation and 'Bilim-Orda' International Social Foundation, which were previously known as KATEV (Kazak-Türk Eğitim Vakfı), coordinate 30 state Bilim-Innovation schools and own 4 private, 2 international schools and 1 university (website). These lyceums were the first schools to introduce English medium instruction in science, mathematics and ICT subjects in Kazakhstan. This happened 15 years before the trilingual education was first announced on the state level [10]. 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. NIS were supposed to implement and then translate their trilingual education experience to all other mainstream schools of Kazakhstan. Consequently, 11432 teachers were trained to teach through EMI in classrooms by various institutions from 2016 to 2019. But, the quality, format and content of the training differed according to the organisation which provided these services [7, pp. 558-565]. As a next step of the policy, the Ministry of Education and Science (MoES) piloted 153 schools to apply EMI in 2017 (zakon.kz 2018).

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 a 'well-thought-out plan' and poorly addressing pedagogical peculiarities of trilingualism in the policy [7, pp. 556-568]. Moreover, in order to satisfy the educational needs of expatriate staff's children working in Kazakhstan, international schools with EMI were opened starting from 1993. Even though the curricula (for instance, Cambridge, IB, American) applied at these schools were designed to cater for the needs of international students and those whose parents work internationally, many local parents found this opportunity very advantageous for their children. Overall, there is an obvious growth in the number of schools with EMI in Kazakhstan and especially in the last decade, numbers plummeted owing to the internationalisation of education and the trilingual policy of the government. Previous studies have primarily focused on elite institutions (e.g., NIS, KTL), leaving mainstream schools and marginalized learners underrepresented in EMI research. This highlights a need to approach EMI not only as a linguistic or policy issue, but also as a dimension of inclusive education.

'Bilim-Innovation' lyceums / 'Bilim-Innovation' International Social Foundation

The very first 'Bilim-Innovation' lyceum (former Kazakh-Turkish school) was opened in the building of the National School of Physics and Maths in 1992 in Almaty. This event was preceded by an agreement between the presidents of the two countries, N. Nazarbayev and Turgut Özal, who were in warm and fraternal relations due to a recent independence declaration by Kazakhstan and Turkey to be the first to acknowledge that. Very soon, there were more than 20 BIL high schools in major cities of the country. Admission criteria for grade 6 students included questions from mathematics, Kazakh history, Kazakh language, and only a few students could get on board, which made these schools elite boarding high schools. These lyceums were very different from any other schools because 90% of the teaching staff were Turkish (www.bil.edu.kz), who spoke only Turkish or Turkish and English. Thus, the medium of instruction of science, mathematics and ICT subjects was English.

Currently, 'Bilim-Innovation' ISF (former KATEV) coordinates methodological work and HR support of all BILs. Although all of the BILs are state-owned, the majority of EMI teaching

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staff there are in the mandatory teacher rotation system of 'Bilim-Innovation' ISF. Additionally, 'Bilim-Innovation' ISF owns two international, four private schools and one university where subjects are taught in English. Many graduates of BIL preferred to pursue their further education in EMI universities, which is why Suleyman Demirel University was opened in 1996. Thus, there is a full cycle of the EMI ecosystem in 'Bilim-Innovation' ISF, which makes EMI development possible both in school and tertiary education.

EMI textbooks

Textbooks in Kazakhstan are normally published in Kazakh or Russian languages mainly by monopolist publishers Mektep, Almaty Kitap and Atamura. However, all EFL, ESL and EMI textbooks for Kazakhstani schools are published by international publishing houses such as Cambridge University Press, Oxford University Press, and Macmillan Publishers. The only exception is a relatively recent development of EMI textbooks from Astana Kitap and Express Publishing. Astana Kitap was founded in 2010, and its main focus was to design preparatory materials for high school students to get ready for the Unified National Testing (ENT). In addition, they published a range of literature for children of different ages (website). As the trilingual policy was announced to be gradually implemented in all schools of Kazakhstan in 2014, Astana Kitap, with a consultation of MoES, started to brainstorm and draft the first bilingual science textbooks (separate textbooks for physics, chemistry and biology). There were two types of bilingual textbooks: Kazakh-English bilingual textbooks and Russian-English bilingual textbooks, with an increase of English content of 25% every term, becoming Kazakh or Russian free textbooks towards the end of the academic year. These textbooks were designed for mainstream schools in Kazakhstan.

Moreover, Astana Kitap designed an English-only textbook for EMI schools. Main consumers of such textbooks are BILs, private EMI schools and 'Daryn' schools. The prototype of Astana Kitap's EMI textbooks is Zambak textbooks, which have been in use in BILs for many years. However, authors of new textbooks applied all the best practices in the textbook industry, which made textbooks engaging and resourceful. Unlike Astana Kitap, Express Publishing is a British company which cooperated with a local EduStream company and jointly developed EMI textbooks for both primary and secondary students. This company produces literature books, teachers' books, workbooks, interactive board software, video clips and more. These two publishers are both listed in MoES's list of approved textbooks for schools, and there are no EMI alternatives for them (zakon.kz). Overall, teaching English textbooks are ordered from the UK and the US, but EMI textbooks, and especially for high school, have been adapted to local mentality and culture.

Research methods and materials

Software and instruments used in the research analysis

The current study used the Scopus CSV database for analysis. A systematic review of the included articles was conducted using the Bibliometric Review and Meta-Analysis (PRISMA) approach and R Studio software. The analysis covered five years from 2020 to 2024, providing the latest author studies, keyword usage, and scholarly focus on EMI in secondary education. The data were retrieved from the Scopus database using the keywords: "English Medium Instruction" AND "Kazakhstan", combined with terms such as "trilingual education", "inclusive education", and "secondary schools". Search criteria required that documents: (a) were published in peer-reviewed journals; (b) were written in English; and (c) focused on Kazakhstan contexts. Non-academic sources and publications not included in Scopus were excluded during the analysis (Diagram 1).

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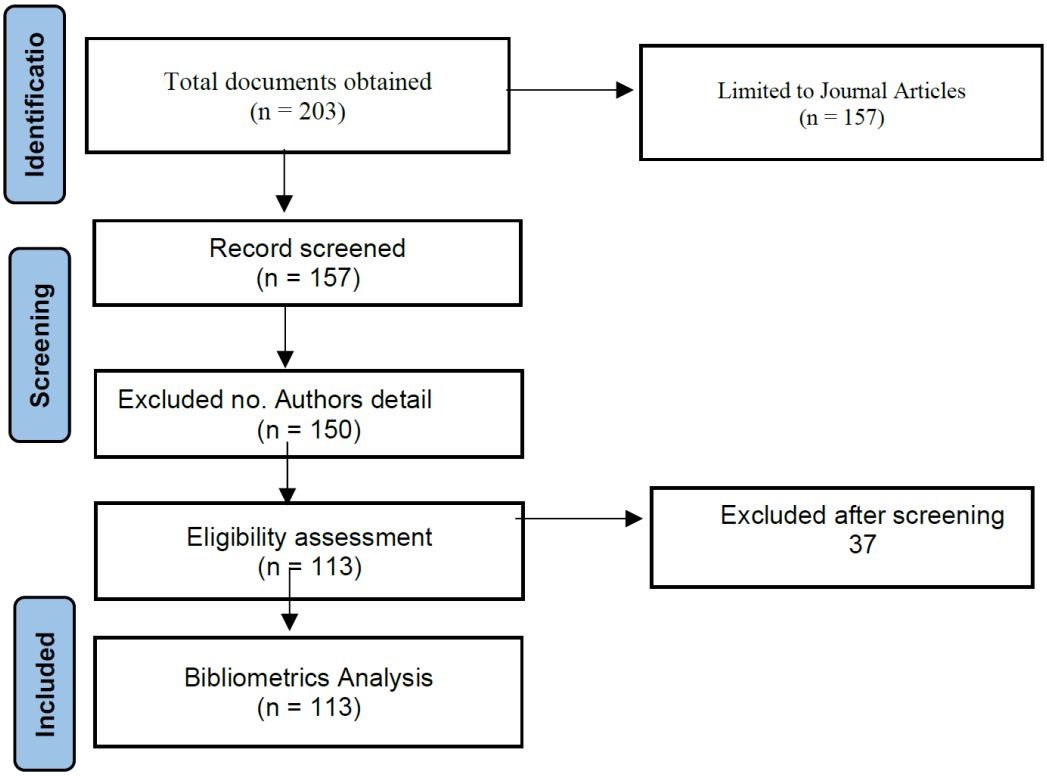

Diagram 1 - Flow diagram of PRISMA and Biblimetrics analysis

Employed bibliometric analysis to assess research trends and patterns in the implementation of English Intermediate Education (EMI) in secondary education, focusing on the experience of Bilim-Innovation lyceums.

Results and discussion

The effectiveness of EMI and inclusive education is strongly influenced by the policy frameworks in place in a country. Sah & Li (2020) examined educational inequality in the Australian context; despite inclusive legislative support, marginalised groups continue to face significant challenges; this highlights the need for comprehensive strategies that integrate the principles of inclusive education within EMI, ensuring that all students are supported [11]. The need for inclusive assessment practices in higher education has also been addressed by Bruin in 2019 [12]. From a socio-political perspective, inclusive education advocates fair assessment that takes diversity into account as a goal. Such approaches are essential to ensuring that all students, particularly those in EMI contexts, are able to effectively demonstrate their learning.

Kazakhstan's education reforms are placing a strong emphasis on modernization, internationalization, and inclusion. Policymakers are working to balance the expansion of EMI with the need for inclusive practices, while ensuring that marginalized groups are not left behind when the language of instruction changes. Let's take a look at the bibliometric analysis of English Medium Education (EMI) in secondary education, based on Scopus, from 2020 to 2024. It includes 113 documents from 81 sources, with a significant annual growth rate of 28.78%. 5 books, 18 book chapters, 1 conference article, and 3 reviews indicate a growing global interest in EMI (Table 1).

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Table 1 - Main information about the EMI Scopus Sources

Description	Results
Timespan	2020:2024
Sources (Journals, Books, etc)	81
Documents	113
Annual Growth Rate %	28,78
Document Average Age	2,73
Average citations per doc	6,531
References	5813
DOCUMENT CONTENTS	
Keywords Plus (ID)	87
Author's Keywords (DE)	384
AUTHORS	
Authors	212
Authors of single-authored docs	33
AUTHORS COLLABORATION	
Single-authored docs	35
Co-Authors per Doc	2,08
International co-authorships %	24,78
DOCUMENT TYPES	
article	86
book	5
book chapter	18
conference paper	1
review	3

The average age of the papers is 2.73 years, and there are an average of 6.53 citations per paper, citing a total of 5813 sources. In the analysis, 87 Keywords Plus and 384 Author Keywords representing different research topics are distinguished. 212 researchers participate in authorship, and 24.78% of publications are covered by international co-authorship. The types of documents include 86 articles.

Annual scientific product

The data shows annual scientific production for the period 2020-2024. It reflects fluctuations in research output due to the impact of the COVID-19 pandemic, recovery efforts, and strategic publishing initiatives. The peak production was in 2024, after the decline in 2023 (Table 2).

Table 2 - Published articles by year

Year	Articles Published
2020	12
2021	26
2022	27
2023	15
2024	33

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- 2020 (12 articles): Low output due to the COVID-19 pandemic, which has halted research and publication activities.
- 2021 (26 articles): Increase, reflecting recovery from the pandemic.
- 2022 (27 articles): Steady increase in research output, reflecting continued focus on EMI.
- 2023 (15 articles): Possible decline due to changing research priorities or external factors.
- 2024 (33 articles): Highest output, reflecting increased research activity, with a focus on EMI.

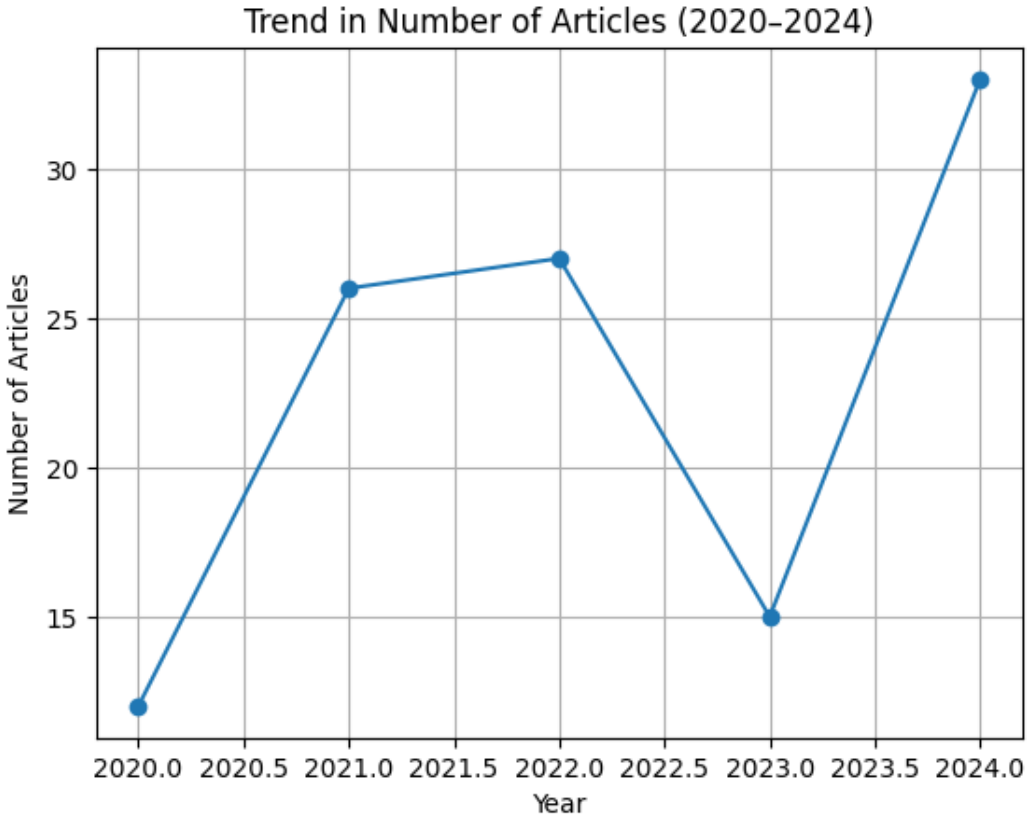

Figure 1 – Annual Scientific Production

The annual scientific output from 2020 to 2024 reflects the impact of the COVID-19 pandemic, followed by recovery and a subsequent increase in research output (Figure 1). Despite a decline in 2023, the overall trend shows a rebound in 2024, with the highest number of published articles. It reflects a refocused and strategic effort in the field of English Medium Instruction (EMI) in secondary education, which has led to a peak in scientific activity and solid results in recent years.

Sources of production over time

It examines data over time on trends in academic research publications related to language planning, English language teaching and learning, multilingual education, and current issues in education over the five years from 2020 to 2024. The table below provides an overview of the number of articles published each year, in major academic journals and research journals (Figure 2).

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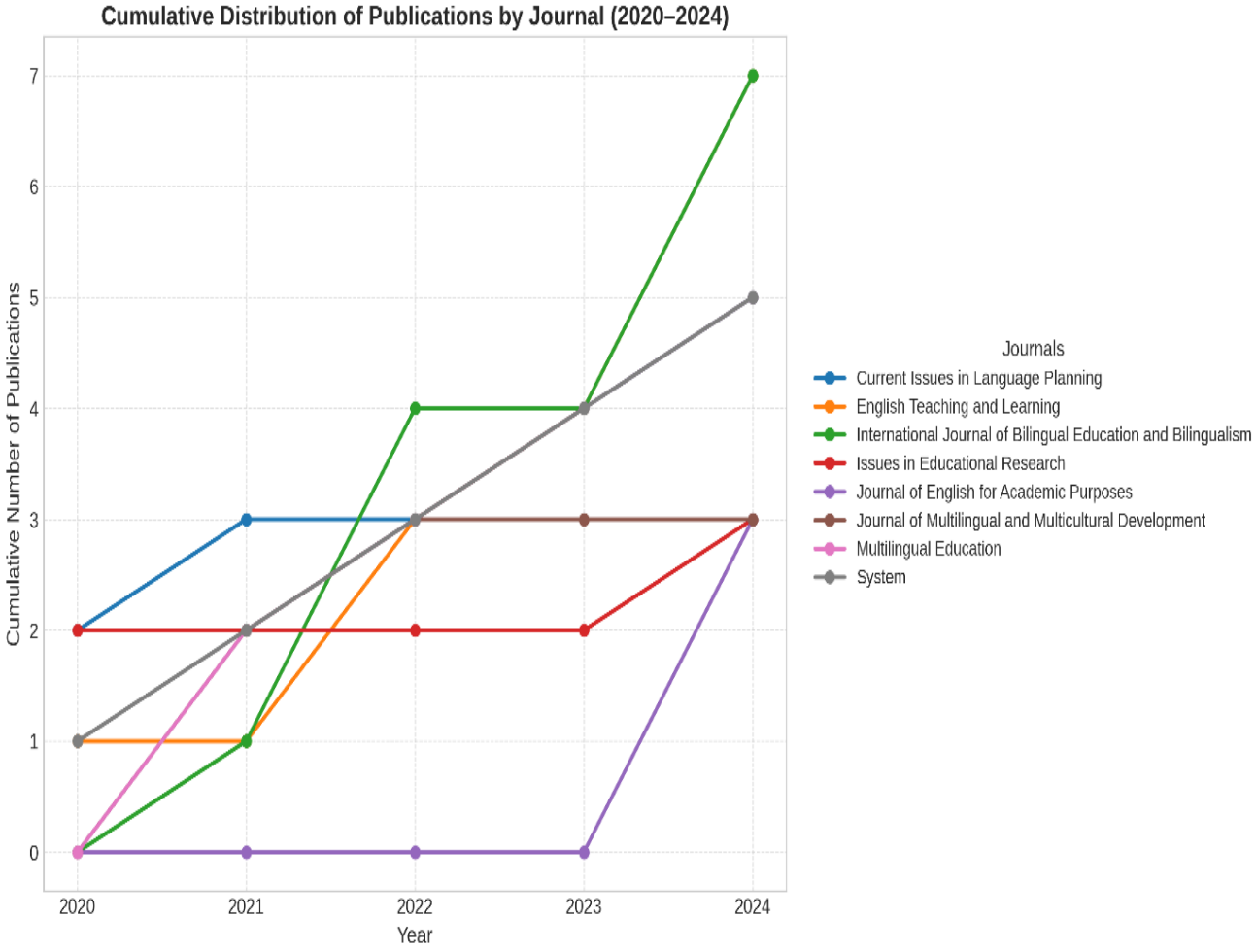

Figure 2 - Sources of production over time

International scientific research, language teaching planning issues, as well as English language teaching, multilingual education, and academic journals such as the Journal of English for Academic Purposes and the Journal of Multilingual and Multicultural Development have been extensively studied. The aim is to identify patterns, changes in research, and emerging trends in these areas of study by analysing the output of scholarly articles.

Table 3 - Publication activity

Year	Inter National	System	Current issues in language planning	English teaching and learning	Issues in education nal research	Journal of English for Academic Purposes	Journal of Multilingual and multi Cultural develop Ment	Multi Lingual education
2020	0	0	2	1	0	2	0	0
2021	1	2	3	1	2	2	0	2
2022	4	3	3	3	2	2	0	3
2023	4	4	3	3	2	2	0	3

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2024	7	5	3	3	3	3	3	3

In 2020, publication activity was relatively low across most categories, with only a limited number of articles published, particularly in fields like English teaching and multilingual education. This period marks the beginning of a trend where scholarly output in these areas was still developing (Table 3).

From 2021 to 2022, there was a noticeable increase in the number of publications across multiple fields. Research in current issues in language planning and English teaching and learning saw significant growth, suggesting an emerging scholarly interest in these areas. This period likely reflects a response to the evolving needs of education systems in addressing language planning challenges and the adaptation of English teaching methodologies.

In 2023, the trend of increased publications continued, with a marked shift towards a greater emphasis on multilingual education and language planning issues. The growing body of research in these areas reflects the increasing global recognition of the importance of multilingualism in education, as well as the need for strategic planning in language policy.

2024 saw the highest number of publications across most categories, with a particularly strong focus on multilingual education, language planning, and related topics. This surge in academic output signals a continued and intensified scholarly interest in addressing the complexities of language acquisition, education policies, and global multilingual challenges, highlighting the significance of these fields in contemporary educational research.

Corresponding Author Countries examine the distribution of research articles published by various countries, categorised into two types of contributions: SCP (empirical/content-based) and MCP (methodological/theoretical). It is shown in Table 4.

Table 4 - Corresponding Authors' Countries

Country	Articles	Articles, %	SCP	MCP	MCP, %
Hong Kong	19	16.8	12	7	36.8
United Kingdom	9	8	6	3	33.3
China	6	5.3	2	4	66.7
Canada	4	3.5	4	0	0
Morocco	3	2.7	3	0	0
USA	3	2.7	1	2	66.7
Indonesia	2	1.8	2	0	0
Korea	2	1.8	1	1	50
Netherlands	2	1.8	2	0	0
Singapore	2	1.8	2	0	0

The findings reveal that Hong Kong leads with the highest number of articles (19), with a balanced focus on both SCP and MCP. China, with a significant 66.7% of articles in MCP, emphasizes methodological contributions. Conversely, countries such as Canada, Morocco, Indonesia, the Netherlands, and Singapore concentrate exclusively on SCP. The USA and Korea demonstrate a balanced approach, distributing their articles evenly between SCP and MCP (Figure 4).

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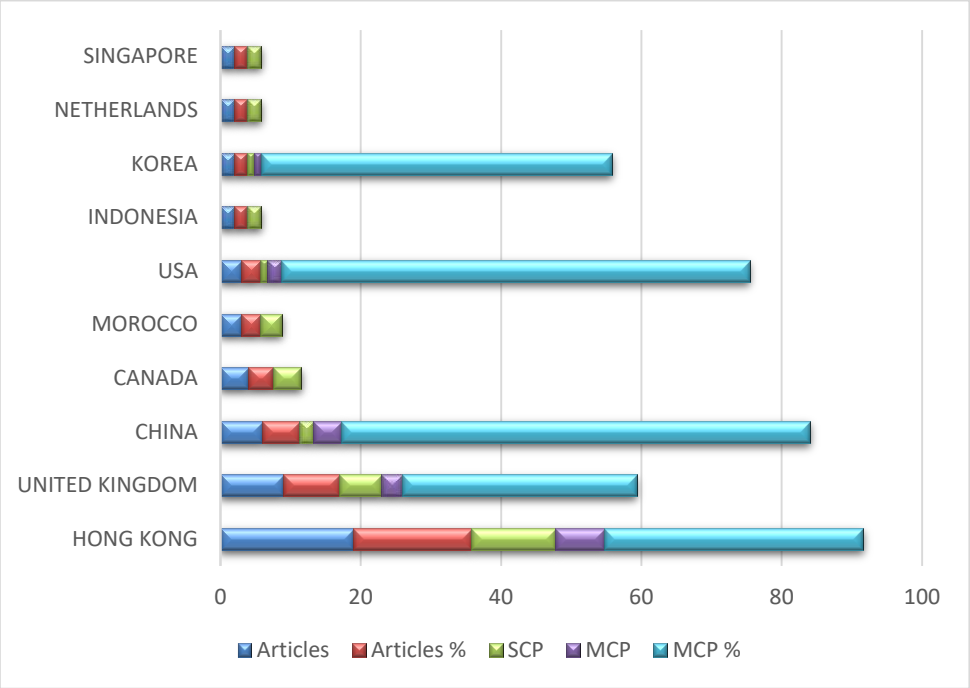

Figure 4 - Distribution of Research Articles by Country and Contribution Type (SCP vs. MCP)

These patterns indicate differing research priorities across countries, with some focusing on empirical findings and others on advancing theoretical or methodological frameworks. The analysis of the authors in this study showed that Kazakhstani-based authors are underrepresented in Scopus-indexed EMI research. Possible reasons include limited access to international journals, lack of publication funds, publication in local languages, and capacity gaps in academic writing in English. Addressing these barriers is essential for strengthening Kazakhstan's voice in the global EMI discourse.

The co-citation network figure represents the centrality of academic authors in a citation network using three key measures: Betweenness, Closeness, and PageRank (Figure 5).

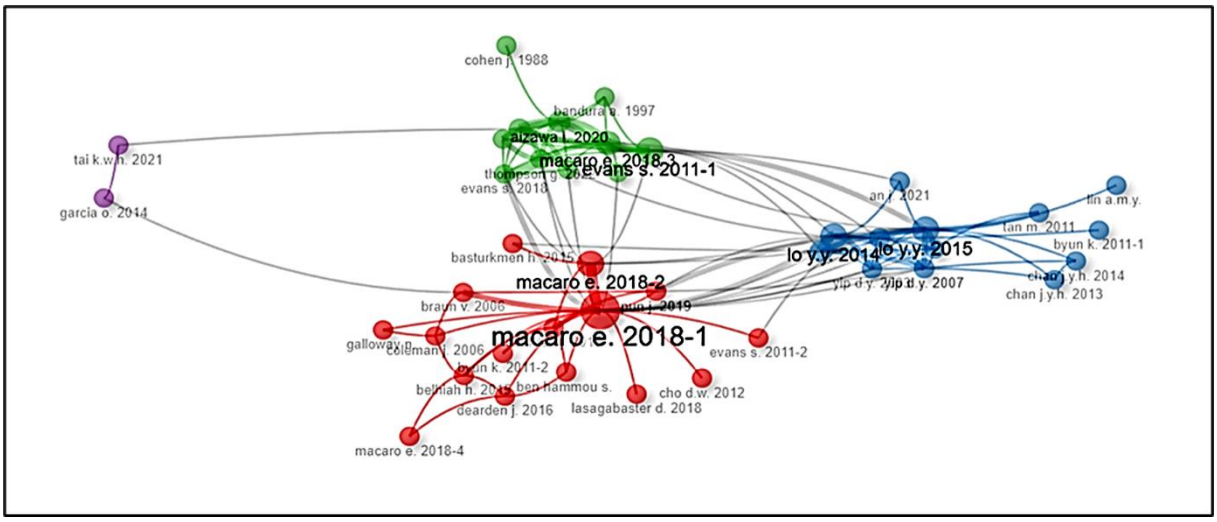

Figure 5 - The co-citation networks

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The figure shows how authors are positioned in the network based on their influence and connectivity. Some authors serve as central figures, while others are peripheral. High scores on these dimensions indicate the importance of the author in connecting to, accessing, or influencing the network.

Distance: Authors with high distance (e.g., makaro, 2018-1 with a score of 532,044) are key intermediaries in the network, connecting groups of authors. A high score on connectivity indicates that the author plays a significant role in the flow of information in the network.

Proximity: These measures how close an author is to all other authors in the network. High values (e.g., 2015, 0.006) indicate that the author can reach others more quickly, indicating that they are well connected in terms of proximity.

PageRank: Measures the importance of an author based on their connections. Authors with high PageRank (e.g., 0.06 in 2015) are likely to have influential connections, suggesting that their work is central to the network.

The spread of EMI in educational settings has attracted considerable scholarly attention worldwide [13]. EMI has emerged as a prominent strategy as countries seek to expand their educational opportunities for internationalisation of their institutions. Macaro et al. (2018) conducted a systematic review of EMI, finding that it has been rapidly adopted as a tool for enhancing the global competitiveness of educational institutions [14]. Compared to global EMI research trends that focus on higher education, language policy, and teacher identity [14], EMI research in Kazakhstan remains relatively limited in scope and quantity, having been conducted only in elite schools. Similarly, Zhang (2018) examined EMI policies in China, highlighting the internationalization of education and its implications for students and faculty [15]. Over the past two decades, the demand for English-medium instruction (EMI) in higher and secondary education has increased rapidly worldwide, driven by globalization and the internationalization of schooling [16]. Many non-English speaking countries have begun to teach EMI to increase their competitiveness. The findings of the study indicate a trend toward EMI being viewed as a pathway to academic and professional opportunities since it enables the development of students' intercultural and pragmatic self-efficacy skills from an early age [17-19].

Conclusion

Overall, recent policy directions and practical initiatives in Kazakhstan support the goals of EMI and internationalization through the creation of inclusive educational environments. Therefore, it is crucial to adopt policies and practices that prioritize equity and access, ensuring that all learners benefit from opportunities in an increasingly globalized educational landscape. The integration of EMI represents a significant change in inclusive education that provides new opportunities and emerging challenges for schools, teachers, and students.

The results of this study indicate a steady expansion of EMI in the secondary education system of Kazakhstan, driven by national policies on multilingualism and the growing demand for English language proficiency. A bibliometric analysis revealed an increase in EMI-focused publications, reflecting the growing international and local interest in language policy, educational reforms, and pedagogical innovations. In this context, the experience of the Bilim-Innovation Lyceums offers a practical example of EMI implementation. Their early integration of EMI into math, science, and other core subjects demonstrates how targeted institutional strategies can impact student outcomes, curriculum design, and even university pathways.

While this study establishes links between global EMI research and the Kazakhstani context, further research is needed to assess the pedagogical impact of EMI in BIL, focusing on teacher training, resource allocation, curriculum adaptation, and student achievement. Future research should also examine the long-term outcomes of EMI adoption and identify sustainable patterns for

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scaling up these practices in other secondary schools. By linking global trends to BIL's localized experience, this study contributes to a deeper understanding of EMI implementation and offers practical insights for shaping Kazakhstan's education modernization strategy.

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