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Transforming primary education: balancing social skills and academic achievement through global inquiry-based learning models

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Introduction: This study explores the impact of the Inquiry-Based Learning (IBL) model on enhancing social skills and academic performance among primary education students across various international settings. Amid the growing demand for 21st-century competencies, IBL offers a pedagogical approach that fosters both cognitive and interpersonal development.

Methods: A qualitative meta-analysis was conducted using the Computer-Assisted Qualitative Data Analysis Software (CAQDAS), specifically NVivo 12 Plus. The study systematically reviewed and analyzed purposively selected literature on IBL implementation in countries such as Finland, Australia, Singapore, and the United States.

Results: The analysis indicates that IBL significantly enhances students' social skills—particularly collaboration, communication, and empathy—while also promoting academic engagement and performance. Success in IBL implementation is closely associated with flexible curriculum policies, as observed in Finland and Australia. In contrast, more rigid, assessment-driven systems present barriers to effective adoption.

Discussion: The findings highlight the critical roles of curriculum flexibility, teacher facilitation, and digital integration in optimizing IBL practices. To maximize the benefits of IBL, the study recommends embedding IBL more fully into national curricula, providing targeted teacher training, and expanding access to digital learning tools. These steps are essential for equipping students with the critical thinking, autonomy, and interpersonal competencies required in the globalized 21st-century context.

KEYWORDS

academic achievement, inquiry-based learning, social skills, primary education, global studies

1 Introduction

Primary education is a very important foundation in one's educational journey. At this stage, children experience significant development in various aspects, including cognitive, social and emotional (Summerlee, 2018). UNESCO, emphasizes that primary education not only plays a role in developing academic abilities such as reading, writing and arithmetic, but also in shaping the social skills necessary for life in society. In this increasingly complex and interconnected era, social skills such as communication, cooperation and empathy are becoming increasingly important, as children will face global challenges that require them to work effectively with

others from different backgrounds. A major challenge facing the education system today is how to balance academic achievement with the development of social skills.

Effective primary education should integrate social skills development into its curriculum. However, the challenge faced by many education systems today is how to balance the demand for academic achievement with the need to develop social skills (Rubio et al., 2022). Many curricula still focus on academic abilities that can be measured quantitatively, such as through standardized tests, so social and emotional aspects are often neglected (Antonio and Prudente, 2024). In fact, social skills are not only important for individual success in further education but also for students' wellbeing in adulthood.

A study by Jones et al. (2015) revealed that although social skills are recognized as an important component of a well-rounded education, many education systems still place too much emphasis on academic achievement. Curricula in many countries still overemphasize academic achievement that can be measured quantitatively through standardized tests. As a result, social and emotional aspects are often marginalized. In fact, social skills are not only important for long-term academic success, but also affect students' mental health and readiness to face the dynamics of global life.

Figure 1 shows the downward trend in scores in reading, math and science from 2000 to 2022 underscoring significant problems in current educational approaches. The sharp decline in student performance, especially after 2015, suggests that traditional teaching methods are no longer effective in maintaining or improving academic achievement in these three key areas. One promising approach to address this imbalance is Inquiry-Based Learning (IBL). IBL is a student-centered pedagogical model that encourages learners to ask questions, explore problems, engage in discussion, and construct knowledge through investigation and reflection. Unlike traditional teacher-centered instruction, IBL positions students as active participants in their learning journey. This model fosters academic engagement and understanding and promotes the development of crucial social abilities such as teamwork, communication, and empathy.

Considering declining student performance in core areas like literacy, mathematics, and science—as evidenced by PISA data (Figure 1)—IBL emerges as a relevant and timely alternative to conventional teaching methods. It is considered more responsive to students' learning needs and better aligned with the demands of the future workforce, which increasingly values soft skills. While countries such as Finland and Australia have successfully

implemented IBL, broader adoption still faces obstacles, particularly in rigid and test-driven systems.

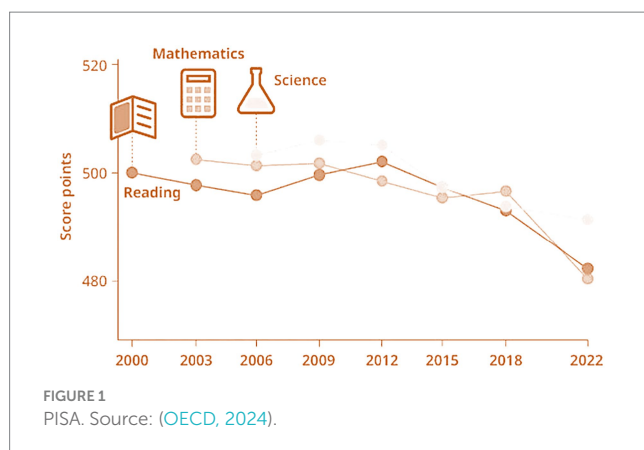
Furthermore, IBL not only focuses on improving academic skills, but also on developing students' social skills, which are crucial in the current context of globalization (Kurtén and Henriksson, 2021). Given the strong link between social and academic skills, implementing IBL can help reverse this downward trend by creating a more dynamic, collaborative and participatory learning environment (Rodríguez et al., 2019). In addition, the role of teachers and technology integration in the implementation of IBL is crucial. Teachers trained in this method, supported by the right technology, can have a significant positive impact, not only in improving academic scores, but also in preparing students to face the challenges of an increasingly complex and globally connected future (Firman et al., 2019; Hamdan et al., 2022).

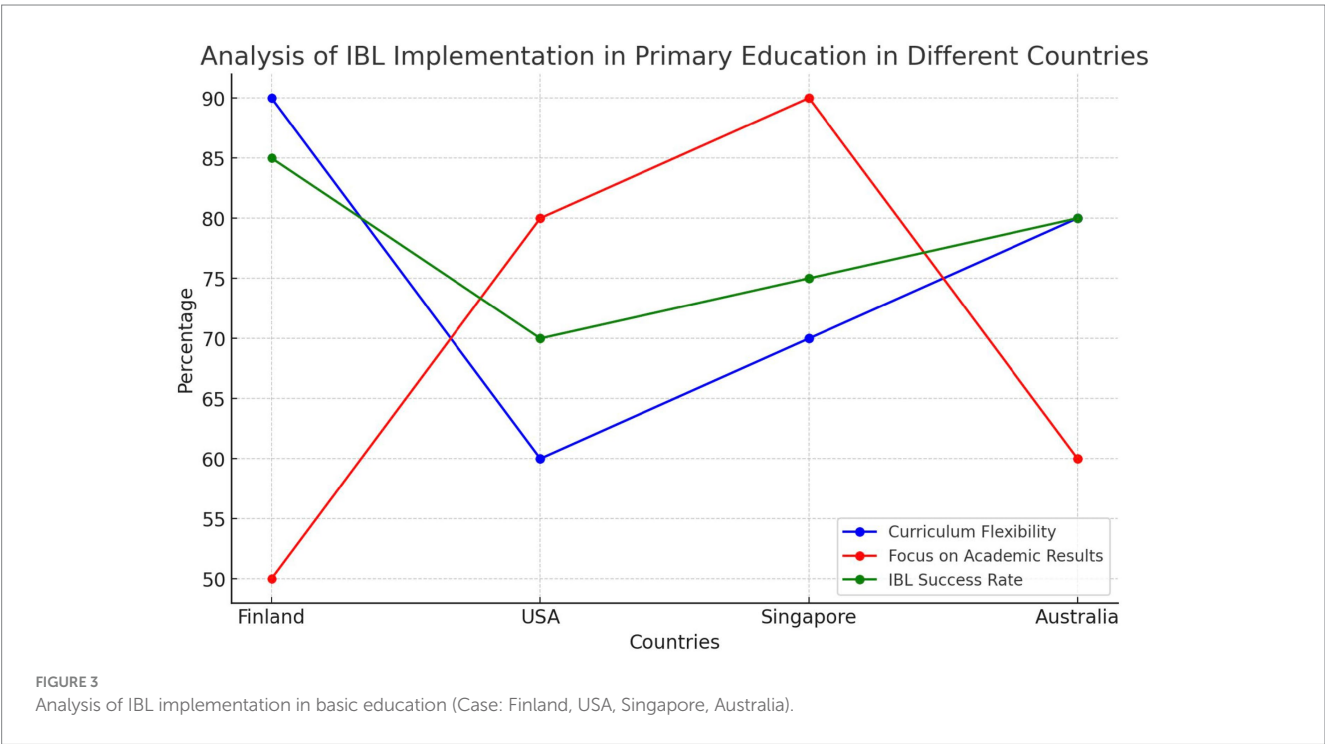
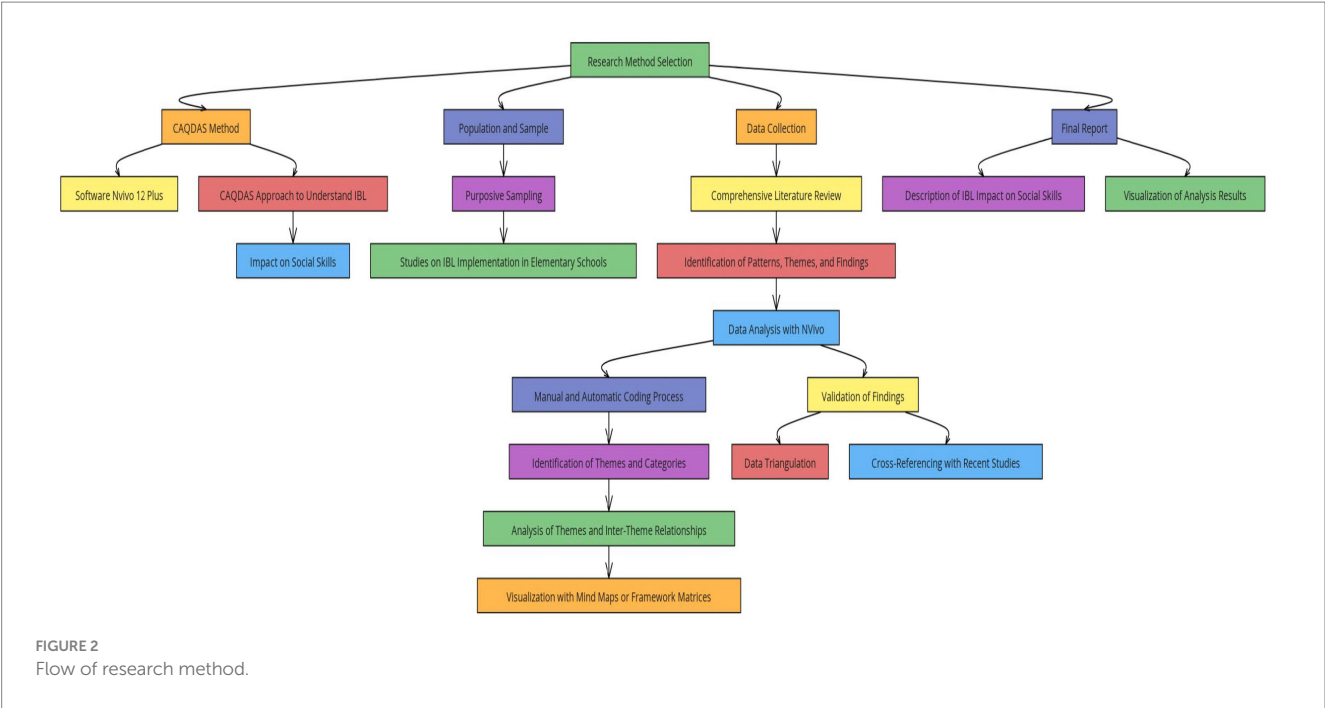
In addition, social skills such as the ability to work in teams, communicate effectively, and show empathy are skills that are in high demand in today's workforce (Tusriyanto et al., 2019). The World Economic Forum (2020) mentions that these skills, often referred to as soft skills, are becoming increasingly important in an increasingly digital and globalized world of work. However, many primary school graduates lack the social skills to meet these challenges (Akaygun and Adadan, 2023). This suggests a gap between what is taught in schools and real-world needs, which requires serious attention from educators and policymakers.

The OECD (2018) through its Global Competence Framework emphasizes the importance of global competence in 21st century education. The framework identifies social skills as a key component that must be developed to prepare students for an increasingly connected world (Chandra et al., 2020). In this context, traditional teacher-centered learning approaches that focus on memorizing facts are no longer sufficient. Instead, more interactive and participatory learning models, such as inquiry-based learning (IBL), are increasingly considered important (Figure 2).

A report from The National Research Council (2012) shows that students who engage in inquiry-based learning show significant improvements in their social skills, including the ability to collaborate and communicate effectively. In addition, data from the implementation of IBL in Finland, known as one of the countries with the best education system in the world, shows that this model not only improves students' academic outcomes but also their social skills. Students in Finland who engaged in IBL reported better collaboration skills and were more empathetic in their social interactions (Figure 3).

The transformation of primary education through Inquiry-Based Learning (IBL) models has become a major concern to improve students' social skills. IBL, which emphasizes active participation, critical thinking and collaboration, is a promising approach in developing social competencies among young learners. This approach encourages students to engage in collaborative problem-solving and inquiry, creating an environment where social skills can flourish. In IBL, students are given the freedom to formulate their own questions and approaches, as outlined by Rasis et al. (2023), who emphasized that open inquiry gives student's autonomy which is essential for developing social skills. They learn to communicate, negotiate and collaborate with their peers in exploring their own questions. This is emphasized by Sandika and Fitrihidajati (2018), who explained that phases in IBL, such as hypothesis formulation and data collection, require teamwork and communication, which further enrich students' social interactions.





However, while the benefits of IBL are widely recognized, there are still some gaps that need to be bridged in research. Most studies on IBL focus on specific disciplines, such as science, without exploring the applicability of IBL in other fields or in the context of basic education more generally. In addition, although the role of teachers is recognized as key in the success of IBL, the specific strategies used by teachers in integrating IBL into daily classroom activities are less explored. Also, many studies only look at the benefits of technology in general without delving deeper into how specific technologies can be optimally used to improve students' social skills. In addition, the

measurement of social skills as an outcome of IBL often receives less attention compared to academic skills.

This study focuses on how Inquiry-Based Learning (IBL) can be a transformative approach in primary education by balancing social skills development and academic achievement. To explore its global significance and practical application, this study examines how IBL is implemented in four countries with leading education systems: Finland, Australia, the United States, and Singapore. These countries were purposively selected for their diverse yet successful approaches to education reform, curriculum

innovation, and student-centered learning. By comparing and analyzing IBL practices in these different contexts, this research aims to identify common success factors, context-specific challenges, and applicable strategies to inform global education policy and classroom practices.

The global scope of this research lies not only in its comparative approach but also in its aim to provide data-driven insights and practical recommendations that can be adapted to various educational environments worldwide - especially in the quest to improve academic outcomes and 21st century social competencies in primary school students. Therefore, this study aims to investigate the global applicability of the Inquiry-Based Learning (PBI) model in primary education, focusing on how this model contributes to developing students' social skills while maintaining or improving academic performance. The research also aims to identify effective strategies for implementation, the critical role of teachers and technology, and practical recommendations for educators and policymakers to integrate PBI into the primary education system.

2 Literature review

2.1 Inquiry-based learning (IBL): definition and core principles

Inquiry-Based Learning (IBL) is an instructional approach that encourages students to learn by posing questions, investigating solutions, and constructing their own understanding. Rather than passively receiving information, students are actively involved in the learning process through exploration, experimentation, discussion, and reflection (Syawaludin et al., 2024). IBL is grounded in constructivist learning theory, which views learning as a process of building knowledge through experience and interaction.

IBL typically involves several key phases: formulating questions, conducting investigations, gathering and analyzing data, drawing conclusions, and presenting findings. These stages require students to engage in higher-order thinking and often promote collaboration and communication with peers (Sandika and Fitrihidajati, 2018). Open-ended inquiry, in particular, gives students more autonomy and responsibility, fostering both independence and social interaction.

2.2 The importance of social skills in primary education

Social skills—such as cooperation, empathy, active listening, and communication—are essential for students' long-term personal and academic success. The World Economic Forum (2020) and UNESCO have emphasized the increasing importance of soft skills in a rapidly changing world. These skills not only help students interact effectively with others but also contribute to their emotional wellbeing and adaptability in diverse environments. Research has shown that early development of social skills in primary school is predictive of later success in education and employment (Jones et al., 2015). However, many primary school curricula still focus primarily on academic content, with little structured effort to develop social and emotional competencies.

2.3 IBL and the development of social skills

Several studies have found that IBL supports the development of social skills by encouraging students to work together in solving problems, discussing ideas, and sharing responsibilities. According to Deák et al. (2021), IBL environments foster emotional intelligence and interpersonal communication by requiring students to engage in collaborative learning tasks. Furthermore, Uiterwijk-Luijk et al. (2019) noted that teacher attitudes toward IBL significantly influence how students interact and inquire, reinforcing the importance of teacher facilitation in social skill development. Collaborative inquiry, especially when facilitated through group projects and discussions, has been linked to improved empathy, conflict resolution, and teamwork. In the Finnish education context, IBL has been credited with creating inclusive classrooms that value student voice and cooperation, which in turn enhances social learning outcomes.

2.4 Academic outcomes and IBL

While IBL is often associated with improving engagement and motivation, it also positively affects academic achievement. Students involved in inquiry-based tasks demonstrate better conceptual understanding and retention, particularly in science and literacy (National Research Council, 2012). The open-ended nature of IBL allows students to connect academic content to real-life contexts, leading to deeper learning. However, the effectiveness of IBL on academic outcomes can vary depending on the level of teacher preparation, access to resources, and curriculum flexibility. In systems where standardized testing dominates, the integration of IBL can be more difficult and may not immediately show measurable gains in test performance.

2.5 The role of teachers and technology in IBL

Teachers play a central role in designing and facilitating IBL experiences. Successful implementation depends on their ability to scaffold inquiry, encourage student autonomy, and manage collaborative activities. According to Rasis et al. (2023), teacher professional development is critical to ensuring that IBL is used effectively and consistently.

Technology also enhances IBL by enabling access to information, supporting collaboration through digital tools, and allowing real-time sharing and reflection. Aghili et al. (2014) emphasized the use of social platforms to extend inquiry beyond the classroom, fostering peer interaction and community building. Similarly, Song and Kong (2014) highlighted how mobile technology enables seamless inquiry, with students collecting data and co-constructing knowledge in dynamic ways.

3 Methods

3.1 Research design

This research approach uses the Computer-Assisted Qualitative Data Analysis Software (CAQDAS) method with NVivo 12 Plus

software to analyze qualitative data systematically and in depth. The CAQDAS method was chosen for its ability to handle and analyze complex qualitative data, allowing researchers to explore various phenomena in a more structured manner (Mortelmans, 2019). In this study, the CAQDAS approach was used to understand the implementation of the inquiry-based learning (IBL) model and its effect on improving social skills in primary education. The selection of this approach was based on the need to manage and analyze data from various literature sources relevant to the research variables. The research aims to investigate the implementation of Inquiry-Based Learning (IBL) and its role in enhancing students' social skills within primary education, based on evidence collected from prior studies in different national contexts.

3.2 Data sources

The population of this study consists of previous research articles and reports examining the implementation of IBL in primary education across various countries, including the United States, Finland, Singapore, and Australia. A purposive sampling technique was used to select literature that met specific criteria: (1) focused on IBL in primary education, (2) reported on the development of students' social skills, and (3) reflected diverse social, economic, and cultural contexts. This approach ensures the findings are both relevant and transferable across different educational settings.

3.3 Data collection

Data for this study was collected through a comprehensive literature review of previous research reports relevant to the research variables (Kennedy, 2016). The search process focused on academic databases and repositories to identify empirical studies, systematic reviews, and theoretical papers discussing the use of IBL and its outcomes in primary education. Literature was selected based on relevance to the research objectives and inclusion criteria defined above. All selected documents were organized and imported into NVivo 12 Plus. The dataset included full-text articles, which were prepared for analysis by cleaning formatting issues and segmenting content based on thematic relevance. The comprehensive nature of the literature collection process enhances the validity and completeness of the study's data foundation.

3.4 Data analysis

Data analysis using the CAQDAS approach with the help of NVivo 12 Plus software began with importing the results of the literature review that had been collected into the program (Edwards-Jones, 2014). The coding process was done manually and automatically to identify themes, categories and patterns that emerged from the reviewed literature (Pan and Tang, 2020). Manual coding involved creating nodes based on themes identified from previous studies, such as "Improving Social Skills through IBL" or "Factors for Successful Implementation of IBL." Auto coding was used to identify keywords or phrases that appeared frequently in the text, which provided an

additional layer for further analysis. NVivo's visualization tools—such as mind maps, tree maps, and framework matrices—were used to explore interconnections between themes and to map the influence of contextual factors on IBL outcomes (Maher et al., 2018; Allsop et al., 2022). These tools enhanced the interpretative depth of the analysis and helped synthesize findings across diverse sources.

3.5 Validity and reliability

Validation of the research findings was conducted through data triangulation, which compares findings from various previous studies to ensure consistency and accuracy of the findings identified from the literature review (Elliott-Mainwaring, 2021). In addition, the researcher cross-referenced with recent studies to ensure that the findings were up-to-date and relevant to the current context (Allsop et al., 2022). The final report of the data analysis was compiled to describe how the implementation of IBL affects students' social skills, accompanied by visualizations that support the results of the analysis using NVivo 12 Plus.

In terms of credibility and validity, the CAQDAS approach with data sources from this literature review ensures systematic and evidence-based analysis. Credibility was maintained by ensuring that the literature reviewed came from credible and peer-reviewed sources, while transferability of findings was achieved by providing a detailed contextual description of the previous research reviewed. Dependability of the study was enhanced by clear and transparent data collection and analysis procedures, and confirmability was achieved through detailed documentation that enabled an audit trail (Allsop et al., 2022). By using the CAQDAS approach and NVivo 12 Plus software, this study was able to analyze qualitative data from the literature review in a more structured and in-depth manner, produce valid and reliable findings, and make a significant contribution to the understanding of the implementation of IBL in basic education based on existing empirical evidence (Elliott-Mainwaring, 2021).

4 Findings and discussion

4.1 Findings

Analysis of the literature collected through the CAQDAS approach with the help of NVivo 12 Plus software resulted in several main themes that illustrate how the Inquiry-Based Learning (IBL) model contributes to developing students' social skills in primary education.

4.1.1 Context of IBL implementation across countries

The analysis shows that curriculum flexibility is significant in implementing Inquiry Based Learning (IBL) in primary education. Finland ranks highest in curriculum flexibility (90%) and simultaneously records the highest IBL success rate (85%). This suggests that a curriculum structure that allows room for initiative, creativity, and participatory learning approaches fosters a learning environment that supports collaboration and the development of students' social skills. Conversely, the United States has the lowest

curriculum flexibility (60%) and the lowest IBL success rate in this comparison (70%). These findings indicate that an overly rigid curriculum can hinder the effective implementation of IBL in classrooms.

A strong focus on academic achievement also affects the effectiveness of IBL implementation. Singapore records the highest focus on academic outcomes (90%), but only achieves an IBL success rate of 75%. The United States displays a similar profile, with an 80% focus on academic results and a 70% IBL success rate. Meanwhile, Finland, with only a 50% focus on academic achievement, successfully optimizes the IBL model. These findings suggest that excessive pressure on academic performance can reduce opportunities for more exploratory and collaborative learning approaches like IBL. A learning environment that is overly fixated on numeric achievements tends to hinder the social processes central to the IBL model.

Overall, the highest IBL success rates were found in Finland (85%) and Australia (80%), followed by Singapore (75%) and the United States (70%). Australia demonstrates a balance between curriculum flexibility (80%) and a relatively moderate focus on academic achievement (60%), which supports successful IBL implementation. These findings reinforce that IBL is more effectively applied in countries where the education system allows for pedagogical freedom and does not impose overly rigid academic standards. A balance between structure and autonomy is key to creating a learning environment conducive to developing social skills through IBL.

4.1.2 The impact of IBL on academic performance and student engagement

Data analysis from four different studies—*PISA (Finland)*, *Australia Study*, *Singapore Study*, and *US STEM Study*—shows that the *Inquiry-Based Learning (IBL)* model positively impacts two key aspects of primary education: academic performance and student

engagement. The PISA study in Finland recorded the highest overall increase, with a 15% improvement in academic performance and a 20% increase in student engagement, totaling a 35% overall gain. This reflects the successful implementation of IBL in an educational system that supports exploration, learning autonomy, and active student participation.

The study from Australia shows a similar trend, with a 12% increase in academic outcomes and an 18% improvement in engagement, indicating that a relatively flexible education context can support positive outcomes from IBL implementation. Meanwhile, the study from Singapore showed more modest results: a 10% increase in academic performance and about 12% in student engagement, suggesting that although IBL has a positive effect, a highly competitive, exam-driven educational environment may limit its effectiveness in promoting active student involvement.

The US STEM study found the lowest results, with an 8% improvement in academic performance and around 10% in engagement. This supports the assumption that IBL implementation requires systemic support, which remains challenging in environments dominated by traditional teaching methods and a focus on standardized assessment. These findings reinforce the evidence that IBL has the potential to improve both academic outcomes and student engagement across various national contexts. However, the level of its effectiveness is significantly influenced by systemic support, including curriculum flexibility, teacher facilitation, and pressure related to academic performance. Educational systems allowing exploratory and collaborative learning demonstrate more substantial results across both indicators (Figure 4).

4.1.3 The influence of IBL on social skills development

Figure 5 shows that implementing Inquiry-Based Learning (IBL) impacts students' social skills in primary education:

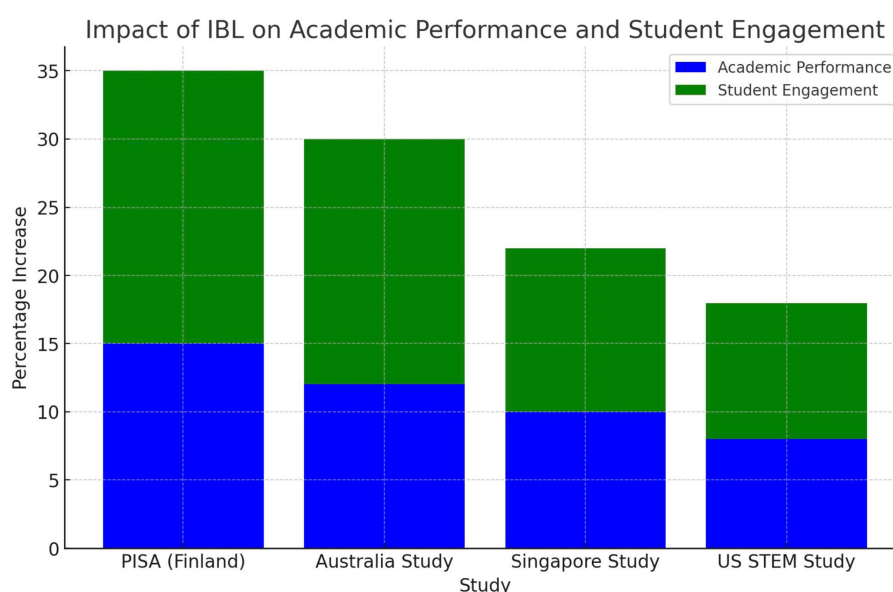


FIGURE 4
Impact of IBL on academic performance and student engagement.

collaboration, communication skills, and empathy. The level of improvement in these skills varies across the countries studied, depending on each country's context and educational system support.

The study in Finland shows the most significant impact, with a 25% increase in collaboration, a 22% increase in communication skills, and a 20% increase in empathy. A collaborative, flexible, and process-oriented learning environment effectively supports students' holistic social development.

Australia also demonstrates strong results, with a 20% increase in collaboration, 18% in communication, and 17% in empathy. This shows that an education system allowing active student participation and exploratory learning strategies can generate positive social outcomes. Meanwhile, Singapore recorded more moderate social skills improvements—18% in collaboration, 16% in communication, and 15% in empathy. Although there is progress, these results suggest the influence of a highly structured and academically oriented education system, which may limit the full potential of IBL in fostering social growth.

The United States showed the lowest improvement among the countries studied: 15% in collaboration, 14% in communication skills, and 12% in empathy. This indicates that implementing IBL in educational environments focused on quantitative assessments and standardized testing may not fully support optimal social skill development.

These findings affirm that IBL can effectively develop students' social skills, especially in primary education. However, its effectiveness is highly influenced by factors such as curriculum conditions, the role of teachers, and the existing assessment systems. Countries with education systems that support collaborative and reflective learning processes show stronger impacts on the development of students' collaboration, communication, and empathy skills.

4.1.4 Supporting factors and barriers in IBL implementation

Implementing Inquiry-Based Learning (IBL) in primary education is influenced by several critical factors, particularly teacher roles, technology integration, and practical challenges in the classroom. One of the most prominent aspects identified is the impact of teacher training, which holds a relevance level of 85%. This highlights that the success of IBL is highly dependent on how well teachers are prepared to shift from traditional teaching roles to becoming facilitators of learning. Proper training enables teachers to design inquiry-driven activities, manage group dynamics, and encourage student collaboration effectively.

Technology also plays a significant role, with 80% relevance attributed to its effectiveness in supporting IBL. When used appropriately, technology enhances access to information, facilitates collaboration, and helps students visualize data during inquiry processes. However, its success relies heavily on digital infrastructure and the teacher's ability to integrate it meaningfully into the learning environment.

Despite its benefits, several implementation challenges persist. Time constraints (75%) and limited resources (70%) are significant barriers identified across studies. Teachers often struggle to find time within rigid curricula to conduct deep inquiry projects. At the same time, a lack of materials, digital tools, and institutional support further complicates the consistent use of IBL.

Another key issue is the overemphasis on STEM fields, with a 90% relevance rate. IBL is frequently applied in science and math but rarely extended to other areas such as language arts, social studies, or civic education. This narrow application reflects a thematic imbalance in how IBL is researched and implemented. Supporting this concern, the lack of research in nonSTEM disciplines—though ranked lowest at 60%—still indicates a significant gap in the literature and practice. In summary, the effectiveness and sustainability of IBL depend not only on instructional methods but also on broader systemic factors. Enhancing teacher capacity, improving access to resources and technology, and expanding research and practice beyond STEM are

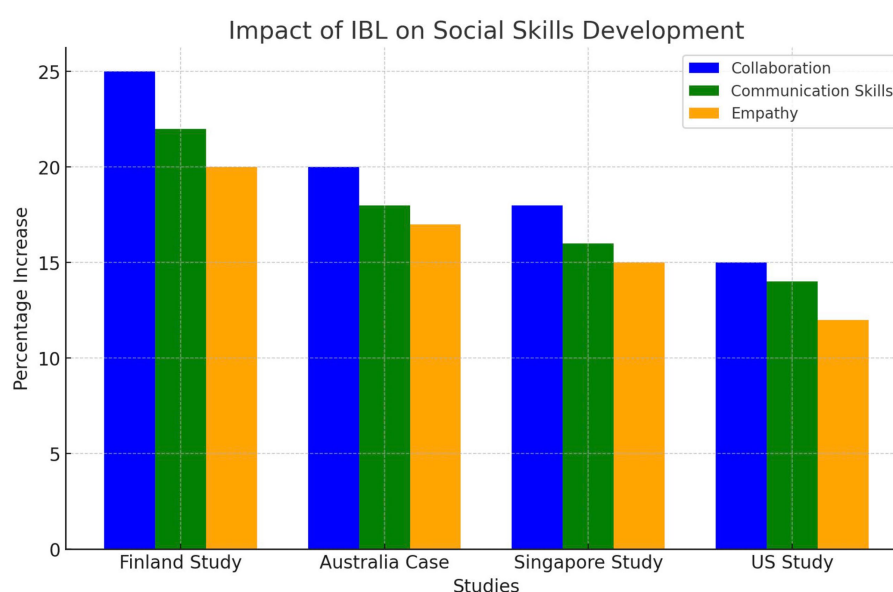


FIGURE 5
Impact of IBL on social skills development.

essential to ensure that IBL can successfully integrate into a broader range of educational contexts.

4.1.5 Teaching strategies and technology in enhancing social skills

A mapping was generated based on qualitative analysis using NVivo 12 Plus to show the relationship between code frequency (based on literature references) and the relevance level in developing students' social skills through implementing *Inquiry-Based Learning* (IBL). The visualization in Figure 6 presents key factors that significantly contribute to this development and the challenges that still hinder optimal IBL implementation. The factor with the highest impact is “Teacher Role in Team Collaboration,” which appears most prominently with a code frequency of 45 and a relevance of 88%. This indicates that the teacher's role as a facilitator in teamwork strongly influences students' ability to collaborate, solve problems collectively, and build healthy social interaction (Figure 7).

Next, “Teacher Approach Stimulating Empathy” also ranked very high in relevance (82%), showing that reflective and open teaching styles are important in fostering social awareness and the ability to understand others' perspectives. Active teaching strategies such as “Problem-Based Learning (PBL)” showed a relevance of 80% with a code frequency of 33, indicating that problem-based projects are also effective in developing teamwork and student communication. On the other hand, technology also plays a key role in supporting social collaboration, as shown by “Collaborative Technology (Google Docs, Teams),” which holds a relevance of 78%. Science digital simulations (75%) and field-based mobile technologies such as GPS (72%) enhance student interaction and participation in real-world contexts, strengthening the connection between classroom learning and the outside environment.

However, the findings also identified two significant barriers that hinder the optimal use of IBL in developing social skills:

- “Teacher preparedness for IBL” (60% relevance, 22 frequency), indicates that some teachers still face resistance or lack sufficient understanding of their new role as facilitators.
- “Limited technology access” (58% relevance, 20 frequency), reflecting the digital infrastructure gap between schools, especially in under-resourced or remote areas.

Overall, this mapping reinforces the finding that strategic teacher support and appropriate use of technology are crucial factors for successfully implementing IBL focused on developing students' social competencies. However, targeted policy interventions and enhanced teacher capacity-building efforts are required to overcome the existing challenges.

4.1.6 Globalization challenges and IBL's contribution

According to the chart, three core competencies are identified as globalization-related challenges: cross-cultural communication, global collaboration, and empathy. However, the data also show that *Inquiry-Based Learning* (IBL) significantly contributes to addressing these challenges by strengthening students' social and interpersonal competencies.

The first competency, cross-cultural communication, is recognized as a globalization challenge by 75% of the sources analyzed. Interestingly, IBL's contribution to developing this skill is even higher, at 80%, indicating that inquiry-based approaches allow students to engage in open discussion, understand diverse perspectives, and express ideas in multicultural contexts. The identified challenge level for global collaboration is 70%, while IBL's contribution reaches 75%. This suggests that IBL promotes teamwork, cross-group coordination, and collective problem-solving—crucial skills in today's global working environments. Regarding empathy, the globalization challenge is 65%, whereas IBL contributes 70%. This supports the view

Key Aspects in Teacher Roles, Technology Integration, and Challenges in IBL Implementation

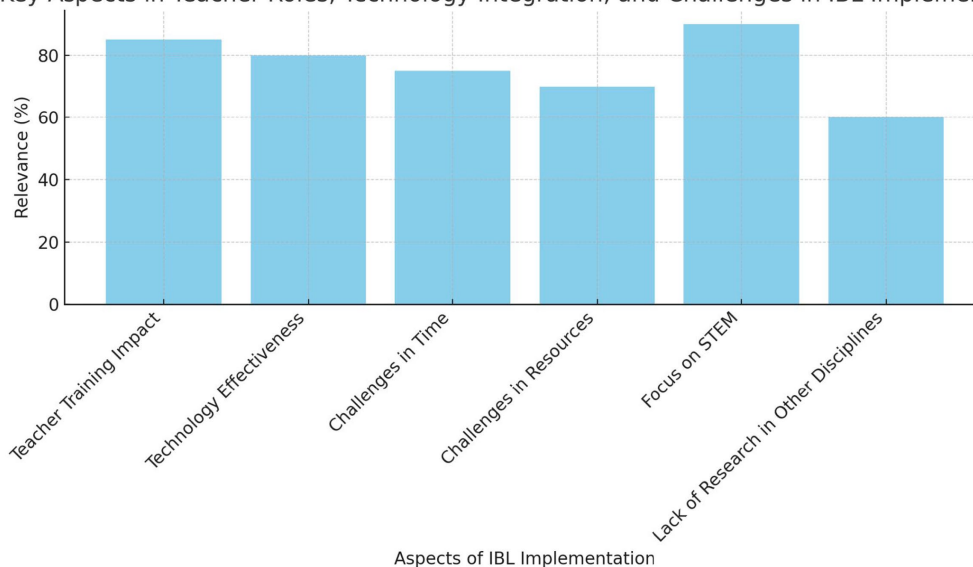
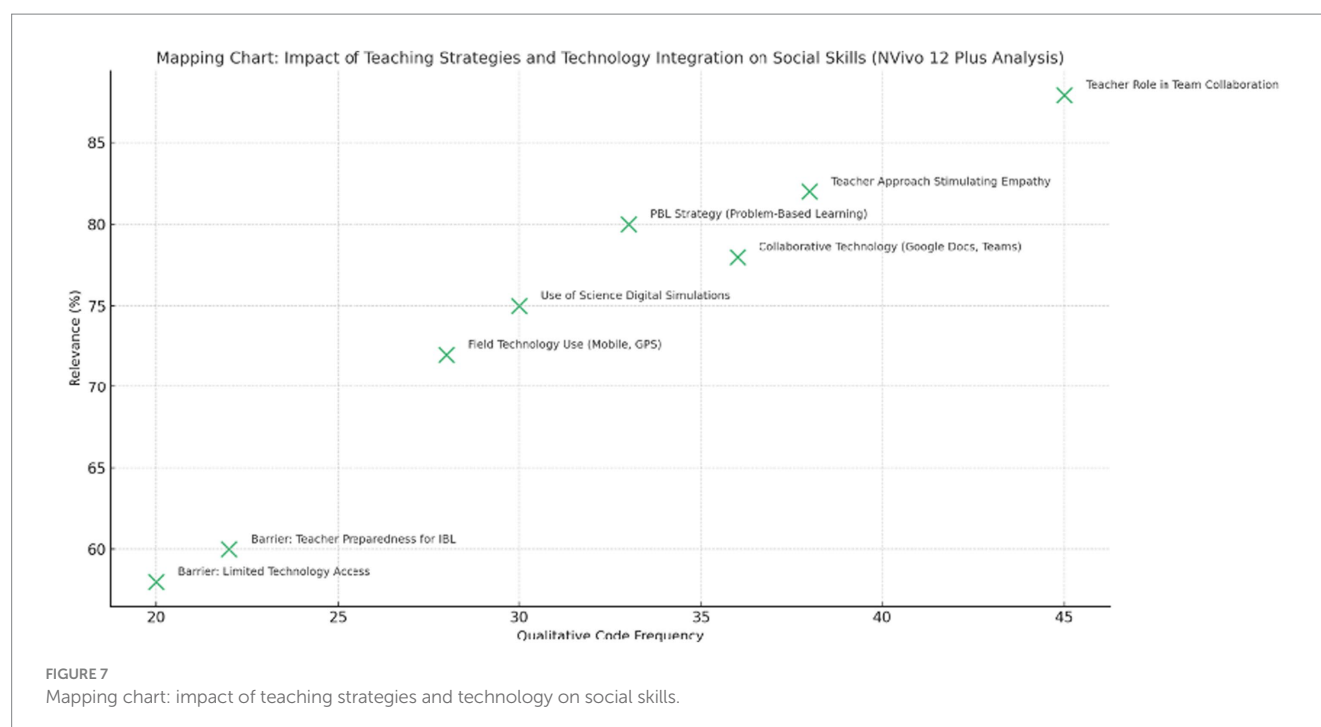


FIGURE 6
Aspect of IBL implementation.



that inquiry processes—where students explore social contexts, cultures, and others' experiences—can enhance empathy as part of a broader set of social intelligence. Overall, these findings affirm that IBL is relevant in local learning contexts and holds strong potential as an educational approach to address global challenges. By supporting the development of 21st-century skills such as cross-cultural communication, global collaboration, and empathy, IBL proves to be one of the most strategic methods for preparing students to thrive in an increasingly connected and complex world.

4.2 Discussion

This research highlights the application of the Inquiry-Based Learning (IBL) model as an effective approach to developing social skills in primary education. IBL allows students to be actively involved in the learning process through exploration, collaboration and problem-solving activities that foster critical and creative thinking skills. In contrast to traditional methods that tend to focus on memorization and measuring academic ability through standardized tests, IBL offers a more participatory approach, where students are invited to ask questions, seek answers, and work together with their peers. As such, the implementation of IBL not only strengthens students' cognitive aspects, but also encourages the development of social skills, such as the ability to communicate effectively, work in teams, and appreciate different perspectives (Odell and Kennedy, 2020). This is very important in equipping students to face the increasingly complex challenges of the real world.

In a global context, the development of social skills through IBL is increasingly relevant as the need for global competence in the world of work and society increases (Strat et al., 2024; Groundwater-Smith, 2019). In this era of globalization, the ability to collaborate with people from different cultural backgrounds, show empathy, and adapt to rapid change are essential skills that every individual must possess

(Chen, 2021). An education system that still focuses too much on academic outcomes alone faces great challenges to prepare students holistically. Therefore, the findings of this study make an important contribution by showing how IBL can be an effective solution in improving social skills in basic education, helping students not only succeed academically but also be ready to become competent and contributing global citizens in the future.

4.3 Analysis of the application on the inquiry-based learning (IBL) model

4.3.1 Context of IBL implementation in basic education

The inquiry-based learning (IBL) model has been implemented in various countries as an effort to improve students' cognitive and social skills at the basic education level (Groundwater-Smith, 2019). In Finland, famous for its progressive education system, IBL is thoroughly integrated in the curriculum, where students are encouraged to think critically and solve problems in a collaborative learning environment. Teachers act as facilitators, giving students the freedom to explore and find solutions independently, while developing their social skills through group work. In Australia, the implementation of IBL has also received great attention, especially in science, technology, engineering and math (STEM) fields, where students are exposed to real-world challenges that require collaboration and joint investigation to achieve optimal results (Pedaste et al., 2021).

However, the implementation of IBL is not uniform across the world. In countries like the US and UK, education systems that are more centred on standardized academic assessments often limit the flexibility of implementing IBL. A more rigid approach to assessment through standardized tests makes it difficult for teachers to dedicate sufficient time to inquiry methods that require in-depth investigation and ongoing collaboration. Meanwhile, in some developing countries,

limited infrastructure, lack of teacher training and access to technology pose challenges to the implementation of IBL. These differences suggest that while IBL offers many benefits, its success is greatly influenced by the local educational context, government policies, and the readiness of schools and teachers to adapt the approach effectively.

The results of this study show that the success of Inquiry-Based Learning (IBL) implementation is highly dependent on the educational system context in each country. This finding aligns with previous literature emphasizing that inquiry-based pedagogical approaches can only thrive optimally in systems that provide curricular flexibility and teacher autonomy (Hmelo-Silver et al., 2007; Barron and Darling-Hammond, 2008).

In Finland, the success of IBL is strongly influenced by an educational philosophy that emphasizes holistic learning. Teachers are granted the freedom to tailor learning to students' needs, allowing the inquiry approach to develop naturally. This learning environment—supportive of collaboration and exploration—offers real opportunities for students to develop communication, teamwork, and empathy skills through peer interaction in problem solving contexts (Lonka, 2018). A similar pattern is seen in Australia, especially in the context of STEM education. The implementation of IBL through real-world, challenge-based projects encourages students to work in teams, engage in discussions, and make decisions collaboratively. This is consistent with the study by Kuhlthau et al. (2015), which highlights that IBL promotes authentic collaboration and open communication, thus functionally strengthening social skills.

However, different results emerge in countries like the United States and Singapore. The high pressure for academic achievement through national assessment standards limits the space for implementing IBL. As noted by Tan (2021), a highly structured and quantitatively focused curriculum makes it difficult for teachers to facilitate inquiry processes, which require time, reflection, and deep group work. As a result, the social skills that should be fostered through IBL do not develop optimally.

This condition highlights systemic limitations that hinder the role of IBL in developing students' social dimensions. Although IBL has been proven effective in shaping interpersonal abilities, its realization still depends on structural support, such as flexible curriculum policies, teacher training, and adequate instructional time (Bell et al., 2010).

The implications of these findings are important for policymakers and education practitioners. If the goal of primary education is to shape individuals who can collaborate, communicate effectively, and possess strong empathy—competencies that are crucial in the 21st century—then education systems must provide more space for the IBL approach, particularly by reducing the emphasis on academic outcomes alone. On the other hand, a limitation of this study is its reliance on secondary literature, so further field research is needed to observe directly how students' social interactions are formed within real classroom contexts using IBL. Therefore, it can be affirmed that differences in IBL implementation directly affect the degree of social skill development among students. Countries with flexible curricula—such as Finland and Australia—provide broader collaborative spaces for students to learn how to work in teams, listen to others' perspectives, and express ideas effectively. In these settings, IBL becomes a concrete medium for shaping communication, collaboration, and empathy skills. Conversely, overly rigid systems

hinder the development of these competencies. Thus, curriculum flexibility and support for collaborative learning are two key factors in successfully developing social skills through the IBL model.

4.3.2 IBL's impact on academic achievement

Inquiry-based learning (IBL) has a significant impact on improving students' academic performance, while encouraging their active engagement in the learning process. A number of international studies, including data from the Program for International Student Assessment (PISA) and case studies in Finland, show that implementing IBL not only improves academic outcomes, but also deepens student engagement in learning (Kori, 2021). IBL allows students to learn in a more participatory and collaborative way, leading to deeper understanding and better critical thinking skills.

One evidence of the positive impact of IBL on academic achievement can be seen from the PISA results in Finland, which consistently ranks highest in science and math literacy. The country's widespread implementation of IBL has provided students with in-depth scientific exploration experiences, with teachers acting as facilitators who support students in formulating questions, designing experiments and analyzing results independently (Teig et al., 2022). As a result, students in Finland not only obtain higher academic scores but also demonstrate a better understanding of key concepts in science and math. Similarly, in Australia, the implementation of IBL in the primary education curriculum focuses on project- and inquiry based learning, which has been shown to improve students' critical thinking skills as well as their ability to solve complex problems, ultimately resulting in better academic scores in the PISA test.

In addition to improving academic achievement, IBL has also been shown to increase student engagement in the learning process. This happens because IBL encourages the development of deep understanding through exploration and discovery. Students are encouraged to seek answers through observation and experimentation which encourages them to better understand abstract concepts in fields such as science and math. This process not only makes students better prepared for reasoning-based exams, but also increases their curiosity and motivation to learn. The active engagement engendered by this method is far greater than passive learning methods, such as lectures, where students tend to be mere recipients of information.

IBL also provides students with important life skills, such as critical thinking, collaboration and problem-solving abilities that are relevant for future success. In Finland and Australia, IBL is not only considered as a method to improve academic achievement, but also to equip students with essential skills for everyday life. Students who engage in IBL are often more confident in facing real-world challenges and could cooperate effectively with their peers in a dynamic and challenging environment. These skills, as seen in the implementation of IBL in Finland, not only affect academic outcomes, but also shape students into more responsible and adaptive individuals to various situations.

Motivation and interest in learning also increased significantly through the implementation of IBL, as students were given the opportunity to explore topics of personal interest to them. This approach makes learning more relevant and meaningful to students, which in turn increases their engagement and academic achievement. In a case study in Finland, the implementation of phenomenon-based learning, which is very similar to the principles of IBL, showed that students not only managed to improve academic understanding, but

also became more skilled at working in teams, solving problems creatively, and actively participating in the learning process. The comparison of the impact of IBL on academic achievement and student engagement can be seen in [Figure 4](#).

The results of this study indicate that Inquiry-Based Learning (IBL) not only contributes positively to academic achievement but also significantly enhances student engagement in the learning process. These findings align with existing literature highlighting the effectiveness of IBL in strengthening conceptual understanding, critical thinking skills, and student motivation ([Hmelo-Silver et al., 2007](#); [Barron and Darling-Hammond, 2008](#)). Data from PISA and various case studies in Finland and Australia support the notion that implementing IBL within flexible primary education systems can improve academic outcomes and essential social skills.

A concrete example of successful IBL implementation can be found in Finland's education system. The comprehensive application of IBL allows students to learn through independent exploration, with teachers acting as facilitators. This approach has led to a 15% increase in academic performance, consistent with PISA data that ranks Finland among the top in science and math literacy. Additionally, student engagement rose by 20%, reflecting high levels of participation, motivation, and curiosity fostered through inquiry-based learning ([Lonka, 2018](#)). In Australia, the use of project-based IBL in the primary curriculum resulted in a 12% improvement in academic achievement and an 18% rise in engagement, showing that this strategy is also effective in enhancing critical thinking and problem-solving abilities.

However, IBL implementation in countries like Singapore and the United States has shown more limited outcomes. Both nations reported academic and engagement gains of only 8–10%, with their highly structured education systems and focus on standardized testing making it challenging to apply inquiry approaches in depth. This is supported by [Tan \(2021\)](#), who noted that pressure from national assessment standards often restricts teachers' ability to create open exploration and collaborative learning spaces—core components of IBL. Thus, although IBL has great potential, its implementation heavily depends on educational policy contexts and curriculum flexibility.

In addition to enhancing academic achievement and engagement, IBL also significantly cultivates life skills such as communication, collaboration, and empathy. Studies in Finland show that phenomenon-based learning, aligned with IBL principles, encourages students to collaborate, solve problems creatively, and actively participate in discussions. This supports the findings by [Kuhlthau et al. \(2015\)](#), who argue that IBL fosters social competencies through learning activities that demand teamwork and open communication. In this context, IBL is not merely a pedagogical strategy—it becomes a strategic tool for shaping adaptive and collaborative learners.

The implications of these findings are significant for policymakers and educators. Education systems that overemphasize academic achievement without providing room for exploration and social interaction limit students' potential to develop the essential skills required in the future. Therefore, policy adjustments are needed to create more space for learning models like IBL that support holistic student development—not only cognitively but also socially and emotionally. This study's limitation lies in its literature-based approach, which does not include direct field observations. Thus, future research is recommended in the form of comparative field

studies or quasi-experiments conducted in various countries with different curriculum characteristics to test further the direct effectiveness of IBL in developing students' social skills.

In conclusion, it is important to emphasize that variations in IBL implementation directly impact the degree of social skill development among students. Countries with flexible curricula and teacher autonomy, such as Finland and Australia, are better able to provide collaborative spaces for students to learn to communicate, work in teams, and develop empathy. In contrast, rigid and academically driven systems like those in Singapore and the United States tend to restrict such collaborative opportunities. Therefore, curriculum flexibility and participatory learning approaches are key factors in ensuring IBL's success as a transformative tool in primary education—balancing academic achievement with strengthening social skills.

4.3.3 Impact of IBL on social skills

Inquiry-Based Learning (IBL) not only leads to academic improvement, but also has a significant impact on students' social skills. Through this method, students are engaged in a collaborative and problem-solving process together, which directly develops social skills such as teamwork, effective communication, and empathy ([Chandra et al., 2020](#)). Several studies have shown that the implementation of IBL significantly improves students' social skills ([Hamdan et al., 2022](#); [Summerlee, 2018](#); [Tusriyanto et al., 2019](#); [Setyosari et al., 2020](#)). Through a student-centered learning process, IBL allows for more intense interaction among learners, both in group activities and during discussions. Finland is one example of a country that shows positive results in developing students' social skills through IBL. Students in Finland are accustomed to working in small groups to solve problems, which ultimately improves their ability to communicate effectively, cooperate, and appreciate other people's points of view. Other studies have shown that students who engage in the IBL process have better cooperation skills, are more proactive in sharing ideas, and are able to listen better to their peers' opinions. In addition, IBL allows students to play an active role in the group, honing leadership skills and empathy for group mates who have difficulty in understanding the material.

The results of this study reinforce that Inquiry-Based Learning (IBL) positively impacts academic achievement and plays a vital role in developing students' social skills, including collaboration, communication, and empathy. This aligns with various findings in the literature ([Hmelo-Silver et al., 2007](#); [Bell et al., 2010](#); [Kuhlthau et al., 2015](#)), which emphasize that inquiry-based learning, with its participatory and collaborative characteristics, creates conditions that encourage students to build stronger interpersonal relationships within the learning context.

Through IBL, students engage in deep social interactions—in group work, discussions, and joint problem-solving. These activities nurture the ability to listen, share ideas, lead, and support struggling peers. In this context, learning occurs not only cognitively but also socially emotionally, strengthening character and essential 21st-century competencies. These findings further position IBL as a practical approach to meeting the demands of globalization, which emphasizes cross-cultural skills, global collaboration, and empathy ([OECD, 2018](#)).

[Figure 5](#) shows that the level of IBL's impact on social skills varies across countries, depending on the characteristics of each education system. Finland recorded the highest increases in collaboration (25%),

communication (22%), and empathy (20%). A flexible curriculum and open learning environment enable Finnish students to work in small groups, engage in meaningful discussions, and solve problems together. This is consistent with Finland's educational approach, which emphasizes the balance between academic success and students' social development (Lonka, 2018; Halinen, 2017).

Australia shows a similar trend, with significant increases in collaboration (20%), communication (18%), and empathy (17%). Implementing project-based IBL and crossdisciplinary integration in primary schools allows students to develop interpersonal skills through teamwork and joint presentations. As Scoular et al. (2020) noted, Australia's education policy has explicitly adopted learning approaches that foster social competencies as part of the future learner profile.

Meanwhile, Singapore and the United States have also shown improved social skills, but to a more moderate extent. Singapore recorded increases of 18% in collaboration, 16% in communication, and 15% in empathy, while the United States showed slightly lower figures. A major limiting factor is the highly standardized structure of the education system, with a strong emphasis on national examination outcomes. In such systems, IBL implementation is often limited and unsustainable, failing to provide enough room for rich social dynamics to develop optimally among students (Tan, 2021).

The implications of these findings indicate that the success of IBL in developing social skills is highly dependent on the degree of curriculum flexibility and the opportunities given to students to engage collaboratively. Countries with education policies that support teacher autonomy, interdisciplinary learning integration, and reduced pressure on academic achievement tend to be more successful in optimizing IBL's social potential. On the other hand, highly structured education systems with rigid evaluation frameworks limit the social function of this approach, even if it still offers benefits in specific contexts.

A limitation of this study lies in its reliance on secondary data and literature, without including field observations that could directly show the social dynamics of students in real classroom settings. Therefore, in-depth qualitative studies across various countries are needed to examine how differences in IBL implementation affect students' social interaction and character development. In conclusion, variations in IBL implementation directly influence the development of students' social skills. Countries with flexible curricula and learning models providing open collaboration space—such as Finland and Australia—demonstrate more significant success in shaping communicative, team-oriented, and empathetic students. In contrast, rigid systems focused on quantitative academic evaluations limit the achievement of these social dimensions. Therefore, integrating IBL as a social learning strategy must be aligned with national education policies and positioned as a vital component in transforming primary education into a more humanistic and holistic system.

4.4 Supporting factors and barriers in implementing IBL

4.4.1 Teacher's role in implementing IBL

Teachers have a very central role in the successful implementation of Inquiry-Based Learning (IBL). Teachers who are specially trained in the IBL method do not simply act as transmitters of knowledge, but rather as learning facilitators who guide students through the inquiry

process (Amos et al., 2020; Aras, 2021; Baan et al., 2019). Teachers who are competent in IBL understand that the learning process should focus on student exploration rather than direct information delivery. Adequate teacher training gives them the skills to create a learning environment that triggers students' curiosity, allows them to ask questions, formulate problems, develop hypotheses, conduct research, and analyze the results (Nguyen et al., 2022; Alqahtani, 2023).

The successful implementation of IBL depends on the teacher's ability to adapt the approach to the needs of the students. In an inquiry-based classroom, the teacher's role as a facilitator also includes providing space for students to make mistakes and learn from their experiences, encouraging reflective processes and helping students find answers to their own questions (Aras, 2021; Baan et al., 2019). Teachers trained in IBL are also better prepared to deal with unpredictable classroom dynamics, where learning often follows a path that is not entirely predictable.

On the other hand, teacher attitude and approach play a key role in developing students' inquiry and social skills (Strat et al., 2024). Teachers who are open to the IBL method often encourage students to be actively involved, stimulate curiosity, and foster students' confidence in finding answers through their own exploration. Teachers' attitudes that encourage free exploration and development of ideas help students to develop critical thinking skills.

This supportive approach also expands students' social skills. In IBL, interaction within the group is crucial, and teachers must be able to organize effective group activities to improve students' communication, collaboration and empathy skills. Teachers who value the collaborative process will ensure that every student could contribute to group discussions, understand the viewpoints of their peers, and learn to work together to complete assigned tasks. Teachers use a variety of concrete strategies and approaches to integrate IBL in daily learning activities (Gholam, 2019; Hamed et al., 2020). Some common strategies include:

- Problem-based learning (PBL):** teachers provide real problem situations that are relevant to students' lives. For example, students are asked to find solutions to water pollution problems in their neighborhood by conducting their own research, collecting data, and then presenting their proposed solutions. This allows students to engage in independent research and develop important problem-solving skills.
- Process-based questioning:** the teacher encourages students to ask questions by starting the lesson from questions that spark discussion, such as "How does climate change affect marine life?" or "Why do some materials conduct electricity better than others?" These questions are designed to stimulate students' critical thinking and encourage them to explore answers using inquiry methods.
- Collaboration in small groups:** teachers often group students in small teams to work together on projects or inquiry tasks. For example, in science lessons, students are asked to design and conduct experiments in groups. Thus, teachers not only teach academic content but also encourage the social interactions necessary for team success.

4.4.2 Technology integration in IBL

Technology plays an increasingly important role in supporting the implementation of IBL. Technology allows students to access a variety of digital resources, such as e-books, scientific journals, instructional

videos and interactive simulations that are relevant to their inquiry process (Loizou and Lee, 2020). For example, in science learning, students can use online laboratory simulations to conduct experiments that are difficult or impossible to do in a regular classroom. In addition, technology also supports collaboration between students inside and outside the classroom. The use of cloud-based platforms, such as Google Classroom and Microsoft Teams, allows students to work together in real time, sharing documents, data and ideas digitally (Kamarudin et al., 2024; Ünlü and Dökme, 2020). This extends the inquiry process beyond the confines of the classroom, allowing students to continue discussions and investigations even after class hours.

The results of this study indicate that technology plays an important and increasingly crucial role in supporting the implementation of Inquiry-Based Learning (IBL). This aligns with findings from previous literature (Kong et al., 2014; Song and Kong, 2014), which emphasize that digital technology expands access to learning resources, strengthens collaboration, and enriches the exploratory learning process. Technology enables students to engage in the inquiry process more broadly, unconstrained by time limits and physical classroom space.

As shown in Figure 6, technology integration has a relevance rate of 80% in supporting IBL success, slightly below teacher training (85%). This indicates that technology is not merely a supplementary tool but a strategic component in creating collaborative, connected, and contextual learning experiences. A concrete example from Finland shows how digital platforms like Google Slides and Docs allow students to simultaneously conduct collaborative projects across different locations. These projects enhance technical skills and strengthen social interaction and students' confidence in digital communication.

Studies in Australia also highlight mobile technologies such as tablets in fieldwork that facilitate direct investigation of scientific phenomena. Students recorded biological findings, uploaded data, and shared results with peers online. This supports findings from the literature (Selwyn, 2012) that technology integrated with inquiry approaches enhances student engagement and connects learning with real-world contexts.

However, the effectiveness of technology in supporting IBL does not come without challenges, which were also identified in this study. Two main obstacles are limited time (75%) and insufficient resources (70%), indicating that IBL requires longer planning and implementation periods than conventional methods and adequate infrastructure to run optimally. This aligns with findings from Hmelo-Silver et al. (2007), who emphasize that inquiry-based learning demands systemic support, including sufficient instructional time and appropriate digital tools.

Another limitation identified is the dominant focus of IBL research in STEM fields (90%), with only around 60% of studies examining its application in the social sciences and humanities. This reflects an exploration gap, even though IBL has great potential to enhance critical literacy, empathy, and communication skills beyond the hard sciences. Further studies are needed to explore how IBL can be adapted in subjects such as history, geography, language, and civics—which serve as prime platforms for developing social-emotional skills and global awareness.

In addition, the interpretation of these findings must also be contextualized within the challenges of IBL implementation in

different local education systems. For example, in systems that are still highly standardized and exam-based, IBL technology is often limited to administrative tasks rather than as a tool for exploration. This highlights the importance of education policies providing access to technology, supporting teacher capacity-building, a paradigm shift in teaching and learning, and realigning assessment systems with collaborative and project-based learning models.

Overall, the analysis results from NVivo 12 Plus indicate that the success of Inquiry-Based Learning (IBL) in developing students' social skills is strongly influenced by two main factors: the role of teachers and technology integration. Teachers are central facilitators in inquiry-based learning environments, rather than merely being content deliverers. The data shows (Figure 7) that the category "Teacher's Role in Team Collaboration" had the highest coding frequency (45) and the most significant relevance (88%), indicating that students' collaboration skills are strongly shaped by teaching strategies that explicitly encourage group work. In addition, "Teacher Approaches That Foster Empathy" also recorded high frequency (38) and 82% relevance, suggesting that teachers who encourage idea exploration and social reflection play a significant role in developing empathy among students.

Concrete strategies, such as Problem-Based Learning (PBL), have proven effective in developing students' social dimensions. In this approach, students are presented with real-world problems that require teamwork. With a frequency of 33 and 80% relevance, this strategy encourages critical thinking and facilitates open communication, joint decision-making, and shared responsibility. This reinforces the findings by Bell et al. (2010), which state that problem-based learning structures provide rich opportunities for social interaction.

On the other hand, technology plays an important role in enhancing social interaction, especially in supporting collaborative work both inside and outside the classroom. Collaborative platforms like Google Docs and Microsoft Teams show 78% relevance, allowing students to share ideas, co-edit documents, and interact synchronously and asynchronously. This extends the inquiry process beyond the classroom and supports effective digital communication. Using digital simulations in science lessons (75%) and location-based apps such as GPS and Google Earth (72%) supports field activities involving direct interaction, joint data collection, and collaborative presentations.

However, challenges remain. The analysis shows that teacher readiness for implementing IBL (frequency: 22; relevance: 60%) and technological infrastructure limitations (frequency: 20; relevance: 58%) remain significant obstacles. Many teachers have not received specific training to manage the dynamics of inquiry-based classrooms. At the same time, limited tools and access to technology in some schools hinder the optimization of digitally supported collaborative activities. These findings are consistent with Tan (2021), who emphasize investing in teacher training and strengthening technological facilities as prerequisites for IBL success.

In conclusion, the combination of active teaching strategies and appropriate use of technology directly correlates with developing students' social skills. When teachers are trained and free to facilitate exploration and technology support, meaningful collaboration, teamwork, effective communication, and empathy can significantly grow. Conversely, when teachers lack pedagogical readiness and access to technology is limited, the social potential of IBL cannot be fully realized. Therefore, strengthening teacher capacity and providing inclusive technology must become priorities in designing inquiry-based

education policies so that primary education's transformation genuinely addresses student development's social aspects holistically.

4.5 Influence of globalization and global competence in basic education

4.5.1 Challenges of globalization to education system

Globalization brings major changes in various aspects of life, including in the education system (Rodríguez et al., 2019). This challenge is particularly evident in the need to develop social skills and global competencies at the basic education level. In an increasingly connected world, students are expected to be able to adapt and compete not only in the local environment, but also in the global arena. This requires an education system that can instill strong social skills and global competence early on.

Primary education plays a central role in forming the foundation of global skills. This is the phase where students begin to understand that the world is not limited to their local community alone (Akaygun and Adadan, 2023; Kamarudin et al., 2024; Amels et al., 2019). Therefore, primary education needs to provide them with exposure to cultural diversity, global challenges and different perspectives. In this context, students should have the opportunity to develop cross-cultural skills that will enable them to interact with people from different backgrounds. For example, they should be able to understand different ways of communicating and appreciate social norms that vary from one culture to another.

The findings of this study support the growing literature that positions *Inquiry-Based Learning* (IBL) as a practical pedagogical approach to foster such skills. As visualized in Figure 6, teacher training and technology integration emerge as two highly influential factors in the successful implementation of IBL, with relevance scores of 85 and 80%, respectively. This reinforces the view that competent, well-prepared teachers and appropriate digital tools are necessary to create learning environments that support inquiry, collaboration, and cross-cultural interaction (Darling-Hammond et al., 2020).

Teachers trained in IBL methods are not just conveyors of content but facilitators of social and cognitive growth. Their ability to guide student inquiry, pose reflective questions, and support collaborative group work contributes to developing empathy, communication, and teamwork skills—key components of global competence (OECD, 2018). For example, studies in Finland and Australia, where teacher autonomy and IBL-based strategies are well supported, show consistent improvements in academic outcomes and students' interpersonal abilities and confidence in navigating diverse perspectives.

In terms of technology, its role goes beyond mere content delivery. Digital tools such as collaborative platforms (e.g., Google Docs, Microsoft Teams), mobile learning apps, and virtual simulations expand opportunities for student interaction, peer feedback, and crossborder collaboration. This is consistent with findings from case studies in Finland and Australia, where students could engage in real-time, team-based research activities inside and outside the classroom. These digital experiences help reinforce cross-cultural awareness and digital empathy—two critical elements of functioning in globalized societies (Selwyn, 2012).

However, several challenges still hinder the full implementation of IBL, especially in rigid, exam-focused, or resource-constrained

systems. Time constraints (75% relevance) and limited resources (70%) are frequently reported barriers. Teachers often struggle to balance inquiry time with curricular demands, and schools may lack the infrastructure needed to support tech-enabled collaboration. These findings echo the concerns raised by Bell et al. (2010), who noted that without institutional support and systemic flexibility, even the most innovative pedagogy may fall short.

Another notable limitation is the disciplinary bias in IBL research. As shown in Figure 6, 90% of IBL implementation and evaluation has occurred in STEM fields, leaving the humanities and social sciences underrepresented, with only 60% coverage. This creates a gap in understanding how IBL can support social skill development in subjects like history, civics, or literature—deeply relevant to global citizenship and empathy. Future research should address this imbalance and explore IBL's potential to build global competence across various disciplines.

In conclusion, the analysis confirms that globalization demands a reorientation of basic education goals beyond traditional academic content. IBL offers a promising pathway for cultivating global competencies such as cross-cultural communication, collaboration, and empathy. However, the effectiveness of this approach is contingent upon two key factors: (1) the capacity of teachers to act as facilitators of inquiry and social development and (2) the strategic use of technology to expand the boundaries of learning. The disparity in IBL outcomes across countries underscores how the flexibility of curriculum and the availability of collaborative opportunities directly impact students' social skill development. Therefore, education systems aiming to prepare globally competent citizens must prioritize the integration of IBL, backed by professional development and inclusive technological access, as a core part of curriculum transformation.

4.5.2 IBL's role in developing global competencies

Inquiry-Based Learning (IBL) serves as an effective method to help students develop global competencies. IBL offers an approach that allows students to actively engage in a process of inquiry involving real global challenges, ultimately building cross-cultural understanding, critical thinking, and collaborative skills (Marian and Jackson, 2020; Divrik et al., 2020). In the context of globalization, students need to be trained to look at a problem from multiple perspectives. IBL is perfect for this as it requires students to undertake in-depth exploration of complex issues. They learn that solutions to global problems often involve cross-cultural approaches and a deep understanding of the local context in different regions. For example, in studying climate change, students will understand that effective solutions require global cooperation, where each country has different responsibilities based on their local contributions and impacts.

The findings of this study reinforce the potential of IBL to foster global competencies, particularly in primary education. As shown in Figure 8, cross-cultural communication, global collaboration, and empathy were identified as key areas where IBL offers substantial contributions—surpassing even the perceived level of challenge posed by globalization in these domains. While 75% of respondents identified cross-cultural communication as a significant challenge, IBL contributed 80% to improving students' skills. Similarly, IBL was associated with 75% effectiveness in enhancing global collaboration and 70% in empathy, despite these recognized challenges in 70 and 65% of cases, respectively.

These results align with existing literature, which shows that IBL encourages students to adopt multiple perspectives, navigate complex

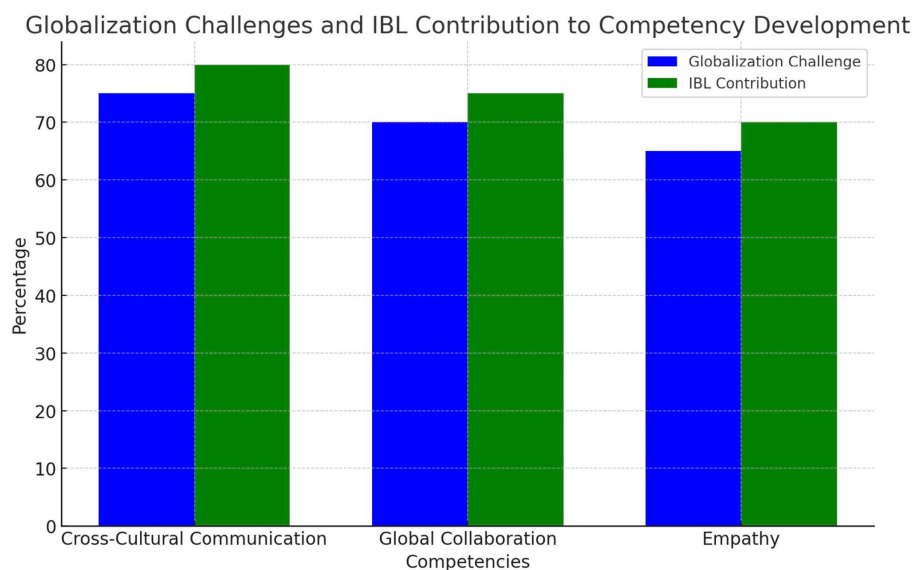


FIGURE 8
Globalization challenges and IBL contribution of competency development.

global issues, and engage meaningfully in culturally diverse learning environments (Barron and Darling-Hammond, 2008). The iterative questioning, investigating, and reflecting process helps students understand that solutions to global problems—such as climate change, inequality, or sustainable development—require a nuanced appreciation of local contexts and cultural differences.

Concrete implementations of IBL in global contexts provide additional evidence of its impact. Cross-cultural collaborative projects, for example, allow students from different countries to investigate shared global issues. In one such project on plastic pollution, students collaborated to examine how local waste management policies affect global ocean health. In another project, students compared the adoption of renewable energy technologies in developed and developing nations, leading to deeper discussions on the role of politics, economics, and cultural attitudes toward sustainability. These projects deepened their understanding of environmental science and sharpened their ability to engage in respectful, empathetic global dialogue.

The integration of digital technologies further amplifies the global potential of IBL. Platforms like Google Docs, Microsoft Teams, and digital field tools enable students to conduct research, share findings, and collaborate on projects in real-time, regardless of geography. This virtual collaboration fosters authentic global teamwork—mirroring workplace dynamics in international organizations and businesses. As Selwyn (2012) argues, digital tools in education should not only support learning but also simulate real-world, multicultural problem-solving environments.

However, while the promise of IBL in developing global competence is evident, several limitations need to be acknowledged. First, successful implementation depends heavily on teacher capacity and institutional support. Teachers must be equipped with pedagogical skills for inquiry, cultural awareness, and digital literacy. Without adequate training and time, global collaboration's depth of inquiry and authenticity can be compromised (Bell et al., 2010). Second, a disciplinary gap remains in how IBL is implemented—most initiatives still concentrate on STEM subjects. There is a pressing need to expand

the use of IBL in humanities and social sciences, where global citizenship education is often situated.

Implications for policy and practice include the integration of IBL as a core strategy in developing 21st-century competencies in primary education curricula. Cross-border collaboration programs, virtual exchanges, and problem-based international projects should be intentionally designed to foster global skills from an early age. Furthermore, collaboration between schools, education ministries, and global partners is necessary to ensure equitable access to the technological infrastructure that enables meaningful global learning experiences.

The discussion confirms that IBL offers academic benefits and serves as a transformative framework for developing the social and global competencies demanded in the current globalized era. Its emphasis on real-world inquiry, student agency, and collaborative problem-solving makes it especially suited to preparing students for complex global realities. However, structural support, interdisciplinary integration, and sustained research on its global applications are essential to realize its full potential. Moving forward, IBL should be positioned as a teaching method and a foundational philosophy for building globally competent learners in the 21st century.

4.6 Research implication and recommendations for educational practice

4.6.1 Implications for policymakers and educators

Based on research findings, Inquiry-Based Learning (IBL) has been shown to be effective in developing students' social skills and global competence, in addition to improved academic achievement. Therefore, it is imperative for education policymakers to consider integrating IBL more broadly into the basic education curriculum. Policymakers should recognize that IBL not only improves critical thinking and problem-solving abilities, but also teaches students the skills of collaboration, cross-cultural communication, and empathy, which are crucial in facing

today's global challenges. Integrating IBL in the curriculum will help create a more holistic approach to education, where students not only excel in academics but are also equipped with relevant social skills.

Education policies should support the development of teacher training programs designed to improve teachers' skills in implementing IBL effectively. In addition, the allocation of educational resources, such as technology and support materials, needs to be directed to assist the implementation of IBL in the classroom, especially in primary schools. Thus, education policy should focus more on active and student-centered learning that combines inquiry-based approaches with social skills development.

The research findings confirm that *Inquiry-Based Learning* (IBL) significantly contributes to academic development and enhances students' social and global competencies. Therefore, policymakers are encouraged to consider the integration of IBL as a core strategy within basic education curricula. This recommendation is based on international findings—including successful implementation in Finland and Australia—where IBL has been widely adopted in primary education and associated with improved collaboration, empathy, and problem-solving skills. For instance, IBL is fully embedded in Finland's national curriculum. Teachers are granted pedagogical autonomy to apply inquiry methods flexibly, resulting in consistently high performance in PISA scores and student wellbeing indicators. In Australia, IBL has been successfully used in interdisciplinary STEM and humanities projects that foster teamwork and critical thinking. These examples highlight how IBL supports holistic development when supported by teacher training, resource allocation, and curriculum design.

To scale such success, education policies must ensure sufficient investments in teacher training, primarily focused on shifting roles from instructors to facilitators. Resistance from educators is often rooted in limited exposure to student-centered methodologies. Furthermore, technological infrastructure—particularly in underserved schools—must be improved to support virtual collaboration, online research, and real-time feedback.

A notable implication is the need for longitudinal research. Studies like those by Geier et al. (2008) and Krajcik and Mun (2014) demonstrate that IBL has positively affected student engagement and science achievement over several years. In contrast, short-term evaluations often fail to capture the full scope of IBL's impact. Such long-term findings should inform future education policies, and comparisons with other active learning approaches—such as Project-Based Learning (PBL)—can help refine the most effective methods in specific contexts. While both IBL and PBL emphasize student agency, PBL is often product-oriented (e.g., creating a solution or artifact), while IBL focuses more on the process of exploration and questioning. Integrating both approaches in curriculum planning can yield complementary outcomes—PBL may better suit applied skills development, while IBL may enhance deep thinking and metacognition (Chu et al., 2021; Yerlikaya, 2023).

4.6.2 Recommendation for the practical implementation of IBL

To assist educators in effectively implementing IBL in the classroom, there are some practical strategies that can be adopted. Educators should play the role of a facilitator who guides students through the process of inquiry, rather than simply providing information. The following strategies can help improve students' social skills through the implementation of IBL:

- **Providing inquiry-based projects:** educators can design projects that are problem- or question based, where students must conduct research, discuss, and work in groups to find solutions. For example, in a science project, students could investigate a local environmental issue, such as water pollution, and then work together to develop a solution based on data and research.
- **Group-based learning:** encouraging students to work in small groups is an effective way to improve collaboration skills. Teachers can divide students into diverse groups, where they work together to solve problems or develop projects together. This not only improves interpersonal skills but also encourages students to understand the perspectives of their peers.
- **Open class discussion:** building communication skills through open discussions is essential in IBL. Educators can facilitate classroom discussions where students can share ideas, ask questions and give feedback to their classmates. Through these discussions, students learn to convey their ideas clearly, listen to others' opinions, and develop empathy.
- **Collaborative evaluation:** engaging students in collaborative evaluation can help them understand the importance of teamwork and appreciate the contributions of their peers. Educators can use the shared reflection method, where students critically assess their work in groups, discussing what worked and what could be improved.

Technology plays an important role in supporting the implementation of IBL, especially in terms of social interaction and collaboration. Some practical suggestions for educators in optimizing the use of technology to support IBL include:

- **Online collaborative platforms:** educators can use online platforms such as Google Classroom, Microsoft Teams, or Slack to allow students to collaborate virtually on inquiry projects. These platforms allow students to share documents, conduct discussions, and complete tasks together despite being in different locations. Thus, technology not only supports the inquiry process, but also enhances social interaction between students.
- **Simulations and virtual labs:** technology can be used to create scientific simulations or virtual labs that allow students to conduct experiments and explorations that cannot be done in a regular classroom. Apps like PhET or Labster allow students to practice laboratory skills while collaborating virtually with their peers.
- **Educational social media:** educators can utilize educational social media platforms to encourage cross-cultural discussions and international collaboration. For example, students can participate in global projects through platforms like ePals or PenPal Schools, where they can interact with students from other countries and learn different cultural perspectives.
- **Use of mobile learning applications:** with the increasing use of mobile devices, educators can integrate mobile-based learning applications in the inquiry process. Apps such as Kahoot! or Socrative can be used to create interactive quizzes, allowing students to collaborate in solving questions and problems on their devices.

This research confirms the importance of Inquiry-Based Learning (IBL) as an approach that can help students develop social and academic skills simultaneously. For policymakers, the main recommendation is to integrate IBL into the basic education curriculum and adopt a

multidisciplinary approach that encourages the development of social skills and global competencies. This approach is not only relevant in the context of national education but also essential in preparing young people for global challenges. For educators, the practical application of IBL requires strategies that incorporate problem-based projects, group collaboration, open discussion and collaborative evaluation to enhance students' social skills. In addition, optimal use of technology can support inquiry-based learning and encourage greater social interaction, both in the physical classroom and in virtual collaboration spaces.

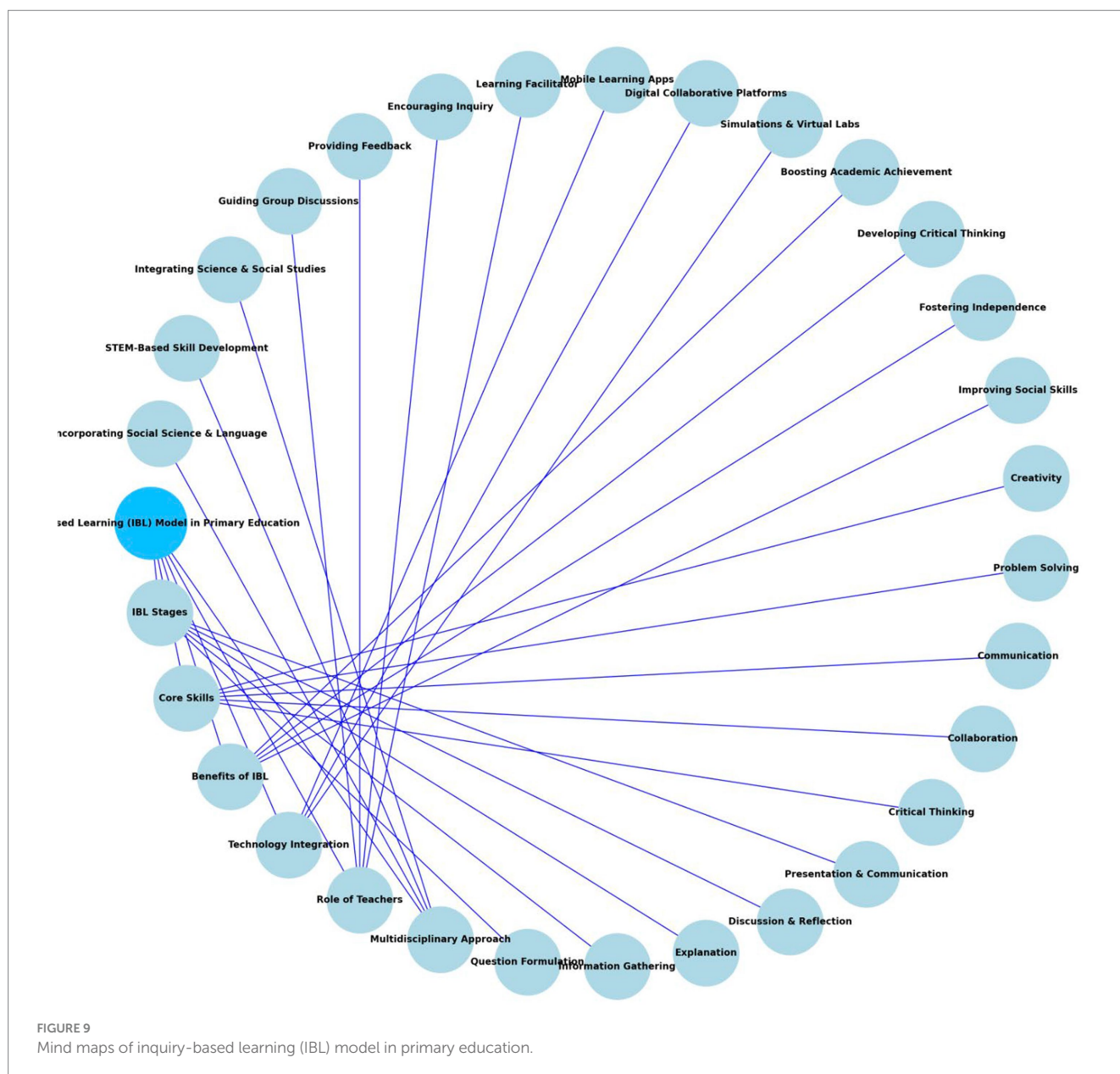
4.6.3 Practical model of IBL in basic education

Figure 9 shows a mind map provides a comprehensive overview of the Inquiry-Based Learning (IBL) model applied in basic education. By highlighting the stages of the inquiry process, the skills developed, the role of technology and the role of the teacher, this diagram shows that IBL is a highly effective and relevant learning method in the modern educational context. Through IBL, students are not only the recipients

of information, but also the prime movers in their own learning, so they are more active in exploring, thinking critically and solving problems.

Further development of this concept could look at the global application of IBL, where the application of this method in different countries may differ according to the cultural context and local educational needs. Understanding how IBL is applied in different cultural environments allows education systems to customize this approach to be more inclusive and effective in various cultural backgrounds. In addition, it is important to consider the integration of IBL into national curricula, both in Indonesia and in other countries, to encourage more active and participatory learning. IBL can be adapted to be an integral part of the national curriculum, aiming not only to improve academic achievement but also to develop students' social skills, collaboration and critical thinking ability.

In addition, the long-term impact of implementing IBL needs to be explored in more depth. It is important to see how this approach



affects students' social skills, academic achievement and professionalism when they continue their education to higher levels or enter the workforce. With the critical thinking and collaborative skills, they learn through IBL, students are expected to be able to adapt to the dynamic global challenges in the future. Therefore, by developing appropriate implementation strategies and making optimal use of technology, IBL can become a dynamic and effective learning approach, empowering students to become critical thinkers, problem solvers and successful collaborators in the future. Technology can play an important role in expanding the scope of IBL through collaborative platforms, virtual labs, and learning apps, all of which will increase student engagement and the effectiveness of inquiry-based learning.

5 Conclusion

The transformation of primary education through inquiry-based learning (IBL) models has demonstrated notable effectiveness in developing students' academic and social competencies. Beyond improving academic outcomes, IBL is vital in strengthening essential 21st-century social skills such as communication, teamwork, and empathy—skills increasingly demanded by the modern workforce amid ongoing globalization and digitalization. These competencies enable students to adapt to real world challenges and collaborate effectively with individuals from diverse cultural backgrounds.

Regarding academic benefits, countries like Finland and Australia have shown that students engaged in IBL perform better, particularly in science and mathematics literacy, as reflected in PISA results. However, the current study primarily focuses on STEM subjects, leaving exploring IBL's impact in non-STEM disciplines—such as language, arts, or social studies—open for future research. Expanding IBL across various curricular areas could provide a more comprehensive understanding of its holistic value.

The successful implementation of IBL heavily relies on the teacher's role as a facilitator rather than a transmitter of knowledge. Teachers who are well-trained in IBL methodologies are more capable of guiding students through collaborative exploration and reflection processes that nurture cognitive and emotional development. Therefore, teacher autonomy and pedagogical flexibility are key enablers of this approach.

Technology integration also plays a crucial role in extending the learning environment beyond traditional classroom settings. Collaborative platforms like Google Docs, Microsoft Teams, or educational apps can enhance peer interaction, co-creation, and asynchronous communication. However, while this study recognizes the importance of technology, it has yet to explore which specific tools or platforms are most effective in supporting social skill development—a gap future studies could address by comparing tools such as digital simulations, social networks, or mobile collaboration apps. It is also worth noting that while countries like Finland and Australia offer strong examples of IBL success due to flexible education policies and strong teacher support, the model's applicability in countries with more rigid educational systems—such as those with a strong emphasis on standardized testing—remains underexplored. Future research should investigate how IBL can be adapted and sustained in such contexts, including culturally diverse or resource-constrained environments.

To optimize IBL's potential, education policies must provide sustained support through targeted teacher training, inclusive

access to technology, and flexible, project-based curricula that allow students to engage in meaningful learning experiences. By integrating cognitive, emotional, and social learning dimensions, IBL can produce a generation of learners who achieve academic excellence and possess the empathy, adaptability, and collaboration skills needed to thrive in a complex and interconnected global society. In conclusion, IBL represents a holistic and future-oriented educational approach that prepares students not just to succeed in exams but to navigate and contribute meaningfully to the challenges and opportunities of the 21st-century world.

Data availability statement

The dataset presented in this article is not available because participants did not provide consent for data sharing. Requests to access the dataset should be directed to SS at: seprie.2022@student.uny.ac.id.

Author contributions

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Generative AI statement

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