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RAPID EVIDENCE REVIEW

EdTech for Girls' Education: A Rapid Evidence Review for the Southeast Asian Region

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Reviewer Antonia Mandry

About EdTech Hub

EdTech Hub is a global research partnership. Our goal is to empower people by giving them the evidence they need to make decisions about technology in education. Our [evidence library](#) is a repository of our latest research, findings, and wider literature on EdTech.

This publication has been produced by [EdTech Hub](#) as part of the ASEAN-UK Supporting the Advancement of Girls’ Education (SAGE) Programme. The ASEAN-UK SAGE programme aims to enhance foundational learning opportunities for all by breaking down barriers that hinder the educational achievements of girls and marginalised learners. The programme is in partnership with the Southeast Asian Ministers of Education Office, the British Council, the Australian Council for Educational Research, and EdTech Hub. ASEAN-UK SAGE is an ASEAN co-operation programme funded by UK International Development from the UK Government.

Rapid Evidence Reviews

This publication is one part of a series of Rapid Evidence Reviews (RERs) that has been produced by EdTech Hub. The purpose of the RERs is to provide education decision-makers with accessible, evidence-based summaries of good practice in specific areas of EdTech. The reviews originally focused on topics which are particularly relevant in the context of widespread global challenges to formal schooling as a result of the Covid-19 pandemic, and now extend to cover further areas. All the RERs are available at <https://edtechhub.org/research/>.

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Abbreviations and acronyms

ASEAN	Association of Southeast Asian Nations
AVR	Augmented and Virtual Reality
EdTech	Educational technology
ICT	Information and communications technology
LMIC	Low- and middle-income country
ODL	Online and distance learning
RER	Rapid Evidence Review
SAGE	Supporting the Advancement of Girls' Education
SEA-PLM	Southeast Asia Primary Learning Metrics
SEAMEO	Southeast Asian Ministers of Education Organization
STEM	Science, technology, engineering, and maths

Executive summary

This Rapid Evidence Review (RER) provides an overview of the existing literature on the use of technology in supporting girls' education in the Southeast Asian region. Research has found that despite relatively high levels of education access in Southeast Asia, with girls attending at equal or higher rates, the level of education quality is highly variable, and the employment and life outcomes from education are relatively lower. The Covid-19 pandemic has further exacerbated the issue of learning poverty, with an estimated 140 million children in Southeast Asia impacted by learning loss ([UNICEF & UNESCO, 2021](#)). Since the start of the pandemic, governments, international development partners, the private sector, and other stakeholders have increased their level of investment in EdTech. Many governments have sought to incorporate EdTech into their broader educational policies and strategies, and by 2021, there were an estimated 108 K–12 EdTech suppliers in Southeast Asia ([Better Purpose et al., 2021](#)). However, much more needs to be done to understand how EdTech can better support girls' education.

Given the relatively higher enrolment rates for girls in primary education in the Southeast Asian region and the varied cultural and educational contexts across the region, understanding the role of technology in Southeast Asia is crucial for ensuring girls' continued access to learning opportunities amidst the disruptions caused by the pandemic and the changing educational landscape. Thus, the RER aims to consolidate existing evidence on the use of technology to mitigate these disruptions and to increase the inclusive use of EdTech, providing insights for educators, policymakers, and donors to make informed decisions regarding the integration of technology in girls' education.

The RER involved a systematic review of literature focusing on technology-enabled education for girls in Southeast Asia, drawing primarily from academic journals within education, social sciences, and humanities disciplines. Emphasis was placed on recent publications from the last two decades to ensure relevance to current educational contexts.

Thematic analysis of the literature revealed three key themes:

- **Girls' engagement with technology in education:** This theme explores how technology can promote educational equality for girls in Southeast Asia.

- **Equity of access to technology:** This theme addresses the barriers that hinder girls from accessing educational technologies on an equal footing with boys.
- **System readiness:** This theme assesses the preparedness of educational systems and infrastructure in Southeast Asian countries to leverage technology for girls' education.

Based on the analysis, five key findings emerge:

- **Access to technology can open up opportunities in employment** beyond education for girls in Southeast Asia.
- **A significant gender digital divide still exists in some contexts** in the region, influenced by cultural biases and gendered assumptions, limiting girls' access to technology despite generally equal access to education.
- **Parents and teachers play crucial roles** as gatekeepers to girls' access to technology, highlighting the importance of their involvement in programme development and training.
- **Governments and other education providers should explore diverse technology options**, such as mobile phones, to overcome gender barriers and infrastructural challenges, fostering inclusive learning environments for girls.
- **More targeted and high-quality research is needed across Southeast Asia** to leverage EdTech better to support girls' education.

Girls' education remains a priority within the region. Although access to basic education in many Southeast Asian countries is relatively equitable, the potential of technology to promote equitable outcomes beyond education (e.g., in employment) for girls in Southeast Asia is an important goal. The literature from the region, although conflicting at times in its treatment of gender-related issues in education, underscores the need for strategic interventions and investments in technology-enabled educational initiatives.

1. Introduction

This RER provides a summary of the role of educational technology (EdTech) in improving girls' educational outcomes in the Southeast Asian region, as well as its potential risks, limitations, and challenges. It aims to offer insight and evidence that can assist in developing and implementing effective EdTech interventions across the Southeast Asian region and beyond.

1.1. Background

This RER provides an overview of how technology has been used within girls' education at primary and secondary levels within Southeast Asia, linking to global evidence where relevant. It contributes to the emerging knowledge base and organises the most relevant literature into coherent themes for the consideration of key stakeholders regarding how to employ technology to benefit girls' education.

On average, girls are significantly more likely to have higher levels of achievement in reading and writing literacy, a pattern evident in all Southeast Asia Primary Learning Metrics (SEA-PLM) 2019 countries ([↑UNICEF, 2021](#)). Despite such high academic performances by girls enrolled in formal schools, the Southeast Asian region has a more significant proportion of out-of-school children at the primary level who are girls, limiting their opportunities and increasing the risk of early marriage, young pregnancies, and poverty. Addressing gender disparities in education is critical to gender equality and broader social and economic development ([↑FCDO, 2023](#)).

The insights presented in this RER are envisaged as principles for planning and implementation processes of technology for girls' education in Southeast Asia. The expectation is that readers will use their expertise from their local context to apply the appropriate recommendations. This means the recommendations are not specific, universally applicable guidelines. Patterns of good practice have emerged from the evidence on how, when, and why technology can be used for girls' education in Southeast Asia, and we believe many of the insights are useful.

1.2. Research questions

Two research questions guide the study:

- What are the key emergent themes in the available literature on the use of technology in girls' education in Southeast Asia?
- What are the key learnings and recommendations that can be drawn from the available literature to promote better practice in the use of technology for girls' education in Southeast Asia and beyond?

1.3. Definitions and scope of the study

For this review, we adopt the following key definitions:

Southeast Asia: Countries that are member states of The Association of Southeast Asian Nations (ASEAN). These are Brunei Darussalam ('Brunei'), the Kingdom of Cambodia ('Cambodia'), the Republic of Indonesia ('Indonesia'), the Lao People's Democratic Republic ('Laos'), Malaysia, the Republic of the Philippines ('the Philippines'), the Republic of Singapore ('Singapore'), the Kingdom of Thailand ('Thailand'), the Democratic Republic of Timor-Leste ('Timor-Leste'), the Union of Myanmar ('Myanmar'), and the Socialist Republic of Viet Nam ('Vietnam'). Timor-Leste has also been included in this category based on its pending membership of ASEAN. All the countries identified above are member countries of the Southeast Asia Ministers of Education Organization (SEAMEO).

EdTech: Educational technology. "[T]echnologies—including hardware, software, and digital content—that are either designed or appropriated for educational purposes" ([↑Hennessy et al., 2021](#)).

Girls' education: The process of achieving gender equity and equality in educational systems, including access to and participation in education. This is not at the expense of boys' education, as "only by involving boys and men can we address harmful gender stereotypes" and address "the barriers holding girls and women back." ([↑FCDO, 2024](#)).

1.4. Theme identification

A systematic screening and search was conducted to identify relevant evidence on using EdTech for girls' education in Southeast Asia. Further details on that process, including the inclusion and exclusion criteria, are provided in [Section 1.6](#). The search and screening process identified 41 papers for analysis. The thematic analysis of these papers led to them

being classified into the three themes listed below, which are discussed in depth in [Section 3](#).

- Girls' engagement with EdTech
- Equity of access to technology
- Digital ecosystem readiness.

1.5. Structure of the RER

In [Section 1.6](#) we discuss the methodological approach, including details of the literature search and eligibility criteria. [Section 1.7](#) outlines the possible limitations of the methodology. [Section 2](#) presents detailed findings under the separate themes that emerged from a thematic analysis of the identified literature. [Section 3](#) concludes the report and provides a synthesis of the findings from the literature according to the three themes mentioned above. The section includes a series of recommendations on how technology in girls' education might best be employed.

1.6. Methodology

The methodological approach is informed by the Cochrane Collaboration Rapid Reviews Methods Group interim guidance on producing rapid reviews ([↑Garritty et al., 2021](#)). This permits a rigorous and systematic approach while defining the scope narrowly enough so that it can be completed within a short span of time.

While the intention was to model this rapid evidence review on a systematic, thematic review of primary studies, it quickly became apparent that there are significant evidence gaps on this topic, particularly in terms of rigorous, quality evaluations or impact studies ([↑Tauson & Stannard, 2018](#)). Consequently, a decision was made to include reviews of other literature or systematic reviews.¹

The review process therefore comprised a systematic sequence of searching and screening. After the research questions and eligibility criteria had been defined, keywords were combined into comprehensive search strings (see [Annex](#)). This focused set of search strings was then input into Google Scholar. The search results were then screened

¹ [↑Higgins et al. \(2023\)](#) distinguish a systematic review thus: “*Systematic reviews seek to collate evidence that fits pre-specified eligibility criteria in order to answer a specific research question. They aim to minimize bias by using explicit, systematic methods documented in advance with a protocol.*”

according to the inclusion criteria, initially on title and abstracts and subsequently on full text.

1.7 Literature search

We conducted the literature search after establishing the search strings provided in the [Annex](#). Google Scholar served as the primary source of literature. [Figure 1](#) below delineates the process of identifying the articles that underwent thematic analysis in this review. Notably, unlike the conventional systematic review approach, which may scrutinise all search outcomes, the rapid evidence review methodology employed here operated within the context of relevance rankings. Consequently, as ranked by Google Scholar, the most pertinent results were screened in the initial phase without proceeding beyond search result pages that no longer demonstrated relevance. Twenty-three articles were initially captured for further screening.

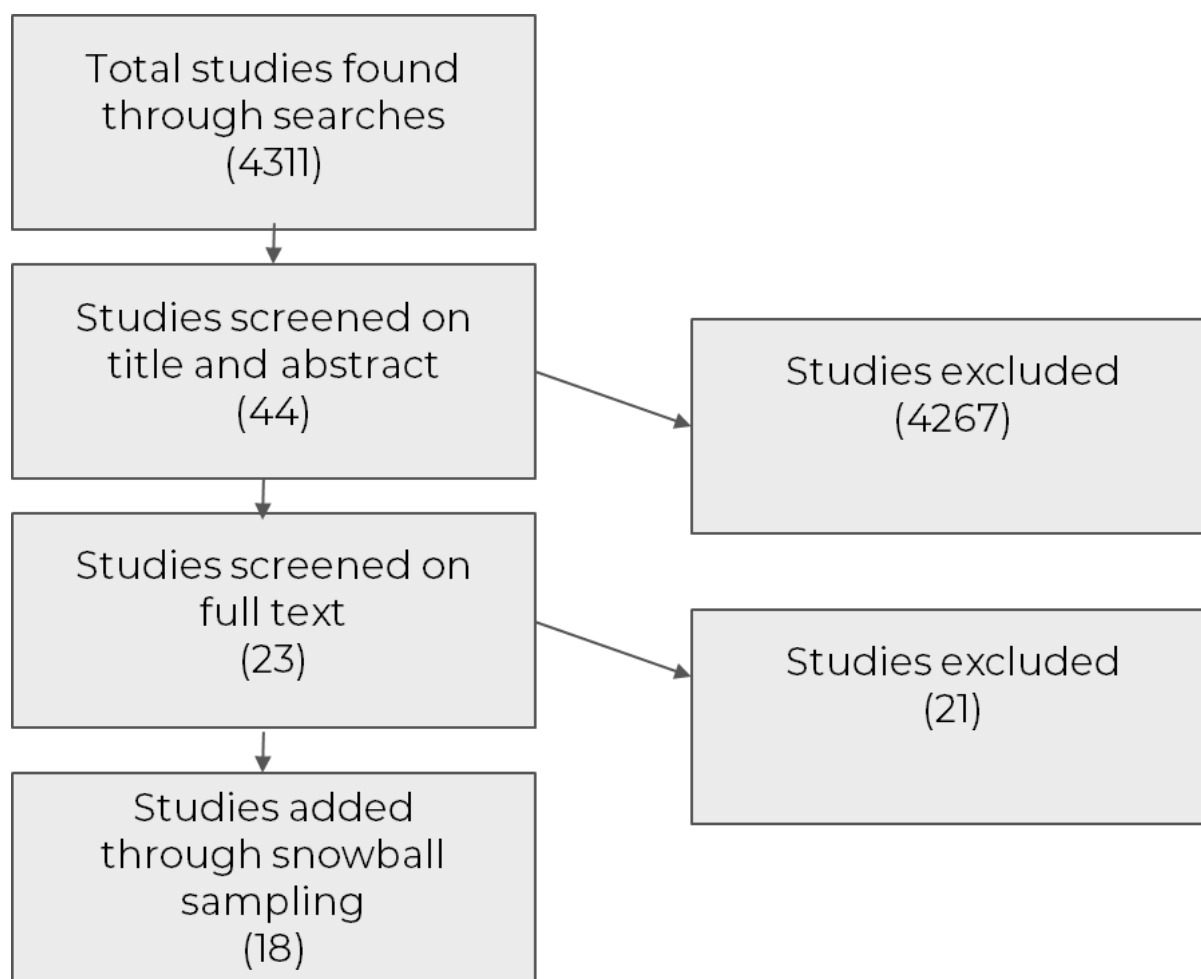
1.8 Screening and eligibility criteria

Both the title and abstract screening and all subsequent screenings adhered to the eligibility criteria outlined in [Table 1](#) below. It is imperative to underscore that the screening criteria were not absolute. For example, in instances where search terms yielded a plethora of studies, the date parameters were modified to retrieve literature from 2009 onwards exclusively. Furthermore, although the bulk of the chosen literature satisfied the eligibility criteria, a small supplementary compilation of literature deemed particularly insightful but did not meet all the criteria was retained. Nevertheless, such exceptions were only granted when an article satisfied all but one of the eligibility criteria. An exception could arise, for instance, if a study delved into the gendered dimensions or utilisation of EdTech, albeit with a focus on tertiary or higher education contexts within Southeast Asia. Such examples were subsequently filtered out following a thorough examination of the text. However, this approach did allow consideration of literature written in non-fluent English if the findings nonetheless merited inclusion. We adopted a proactive approach to ensure the inclusion of literature published in the region to reflect more locally relevant academic publications from journals which may not have substantial funding or international support.

Table 1. *Eligibility criteria for literature searches and screening*

Criterion type	Inclusion criteria
Focus demographic	Girls
Education	Primary and/or secondary
Geography	Southeast Asia
Literature (type)	All
Date range	2009–present (2024)

During the full-text screening stage, papers were also screened for quality issues and methodological rigour (see [Figure 1](#) below). We also needed to make a decision regarding the inclusion of literature on girls' involvement in IT classes within Southeast Asia. A distinct body of literature investigating girls' limited participation in IT or STEM subjects exists within these countries. However, while offering valuable contextual background, we determined that this literature focused on education in technology-related subjects, which is substantially distinct from exploring the role of technology in enhancing girls' education, so we discounted it.

Figure 1. Literature search and screening process

This RER also included a round of additional literature searches to ensure a specific focus on regional initiatives and evidence. While the initial literature searches completed through Google Scholar drew on evidence from global contexts, they did not always return high-quality and significant findings from the Southeast Asian region. This resulted in a lack of data on regional-specific insights relating to the use of EdTech for girls' education.

We carried out additional targeted searches disaggregated by country to ensure the RER maintained its focus and encompassed representative detail from various contexts across the Southeast Asian region. These searches had reduced focus on returning academic literature and placed greater emphasis on drawing examples from grey literature, such as institutional reports or evidence mapping documents, and snowball sampling from relevant sources included in the primary literature searches.

Results from these additional searches were screened on title and abstract (or similar summary) according to the eligibility criteria detailed in [Table 1](#) above. Studies that met the criteria were subsequently analysed in full to

pick out key themes, findings, and relevant recommendations for the region.

1.9. Limitations

The limited timeframe and nature of the available evidence resulted in several limitations, four of which are highlighted below.

- **Limited availability of data:** There is an acknowledged and long-standing gap in the evidence base on EdTech and girls' education ([↑Joynes & James, 2018](#)), particularly in rigorous evaluations, impact studies, and the perspectives of girls and women in basic education. Much of the literature examined either draws on narrative summaries of 'good practice' from existing projects or evidence from EdTech interventions in other low-resource contexts ([↑Joynes & James, 2018](#)).
- **Overlaps in the literature:** Because of the limited availability of data, it was not always possible to draw from studies that solely focused on the use of technology in pre-tertiary education in girls' settings in Southeast Asia. On some occasions, the literature also incorporated conflict and emergency settings more broadly (notably [↑Burde et al., 2015](#); [↑Carlson, 2013](#); [↑Tauson & Stannard, 2018](#)), access to all levels of education, including tertiary education (notably [↑UNESCO, 2018](#)), and girls' education across the globe including in high-income countries (notably [↑UNESCO, 2018](#)).
- **The search and inclusion strategy:** An inherent limitation of the RER is that the search and inclusion strategy is not, by design, exhaustive, and therefore, not all relevant literature may have been located and included. The limitations of Google Scholar and potential bias in academic research have been noted. However, the ease of searching and the inclusivity of journals and publications from the Southeast Asian region made this option more attractive.
- **The reliance on Google Scholar:** One drawback of relying on Google Scholar as the principal literature source is the prevalence of low-quality—often non-peer-reviewed—papers during the initial screening phase. While the title and abstract may have showcased the requisite relevance for inclusion, the substantive content frequently proved to be of substandard quality.

2. Systematic review and thematic analysis

This section covers the primary analysis and synthesis of the literature surfaced through the search, discovery, and screening process. The findings are presented in three themes, with analytical categories discussing recurring topics in each theme.

2.1. Girls' engagement with EdTech

Inequality in girls' access to EdTech is well documented. Where girls do get access, many studies offer an optimistic view that this access to technology can improve girls' education by expanding and enhancing learning opportunities. This section explores the potential for technology to promote educational equality for girls in Southeast Asia. The following themes emerged from the literature and are discussed in turn.

- **Girls' use of technology:** Studies show that girls are likely to respond with a high level of engagement when barriers are removed, and they are given access to technology and technology-enabled education.
- **Benefits of girls accessing technology:** A number of studies agree that access to technology has been shown to be disproportionately more empowering for girls and women than for boys and men, with the advantages for girls expanding beyond the realm of formal education to empower them in other areas of life.

2.1.1. Girls' use of technology

Literature searches identified three main considerations relating to girls' use of technology in education. First, girls' ability to access and engage with EdTech can be more limited than boys' due to cultural values in certain Southeast Asian contexts, such as Cambodia ([↑Asian Development Bank, 2022](#)). Likewise, in Indonesia, girls' access to technology and EdTech is limited due to cultural bias and gendered assumptions, which means girls are afforded reduced access to technology (both inside and outside the classroom) ([↑Abidin et al., 2017](#); [↑Rui & Upadhyay, 2022](#)), reducing their participation in and satisfaction with learning. This is the case despite evidence that access to technology disproportionately empowers girls relative to boys.

Second, examples from other contexts in the Southeast Asian region have demonstrated that where girls have greater opportunities to access

technology, their access to education is increased. In examples from Malaysia and Brunei Darussalam, [Ahmad et al. \(2023\)](#) discuss the impact of social media on girls' education during Covid-19 school closures. They highlight that the number of girls participating in online learning in Malaysia increased during the pandemic from 43% in 2019 to 51% in 2021, with Malaysian girls demonstrating greater participation in education and training programmes utilising digital technologies. Educational programmes delivered through social media (such as the 'Go Digital ASEAN' programme in Brunei Darussalam) particularly focused on providing educational opportunities for marginalised populations, including girls, endeavouring to increase their digital literacy and educational attainment ([Ahmad et al., 2023](#)). A case study from Myanmar regarding use of mobiles by women and girls illustrates this point in [Figure 2](#) below.

Figure 2. *Mobile technology in Myanmar*

Mobile technology in Myanmar

The 'Empowering Women and Girls through Mobile Technology' programme in Myanmar, a component of the 'Connect to Learn project', targets marginalised girls in rural areas ([Qualcomm, 2021](#)). This initiative aims to enhance English language proficiency and life skills among these girls, serving as a catalyst for empowerment and improved secondary school retention rates. Leveraging mobile technology, the programme provides innovative learning resources accessible to remote communities, bridging educational gaps, and fostering self-confidence among participants, including 17,000 girls. By equipping girls with linguistic and practical skills, the initiative not only enhances their academic performance but also empowers them to navigate challenges and pursue opportunities in their lives. Through its emphasis on education and skill development, particularly in underserved regions, this programme contributes significantly to breaking the cycle of poverty and inequality, creating pathways for girls to realise their potential and actively participate in shaping their futures.

Third, personal device ownership can increase girls' access to EdTech and educational opportunities that leverage technology. Among those with access to the Worldreader app,² significantly greater use of the tool has been recorded among female readers than male readers ([Chew & West,](#)

² The Worldreader platform is aimed at young people, and according to [Dunkerly-Bean & Crompton \(2018, p. 593\)](#): "The average age of participants in this study was 24. Over 90 percent of the survey respondents were under the age of 35, and two-thirds of respondents were under 24 years old."

2015; ↑[Dunkerly-Bean & Crompton, 2018](#)). This greater use may be due to e-reading devices used to access Worldreader being considered more of a personal device, where girls do not need to compete with their peers for use.

Further evidence of the importance of personal devices in the region comes from Indonesia. ↑[Hanif et al. \(2018\)](#) highlight that secondary-school-age girls in Indonesia have a high degree of familiarity with mobile devices and access to them. However, mobile phones are underutilised in classroom teaching and learning. Mobile-phone-based learning programmes and systems may represent an appropriate modality with which to target girls through technology, particularly as it has shown promise in promoting personalised learning opportunities in Indonesian secondary schools (↑[Sulisworo & Toifur, 2016](#)). However, having sufficient opportunities for girls to participate equally in mobile-phone-based learning is essential to realise this promise.

But while technology-assisted education can be hugely beneficial to girls, the use of technology risks heightening gender disparity if gender dynamics are not considered. Any educational projects that look to leverage technology must always attend to the “gendered nature of human interactions with technology in the design and implementation of the program [or risk] exacerbating existing gender and related divides” (↑[Steeves & Kwami, 2017, p. 184](#)). Additional measures, such as teacher professional development, including inclusive and gender-responsive instruction, should accompany EdTech programming in Southeast Asia. Without these measures, teachers may be liable to reinforce existing gender stereotypes and divisions (↑[Brussino & McBrien, 2022](#)).

2.1.2. Benefits of girls accessing technology

Several studies have found that women and girls with access to technology benefit from its use to a greater extent than their male counterparts. For example, ↑[Khan & Ghadially \(2010, p. 670\)](#) conclude that “technology holds empowerment potential for disempowered groups generally, and an equalisation potential for women particularly.” Furthermore, their study found that women continued to benefit disproportionately from access to technology even when both genders had equal access.

Across the Southeast Asian region, the benefits of providing girls access to technology, as detailed above, have been evident in terms of education and employment opportunities (that are facilitated through education). For instance, ↑[Espinosa et al. \(2023\)](#) presented a case study on the use of EdTech in the Philippines, demonstrating that female Filipino students have significantly higher skills than boys in various digital competencies

(e.g., literacy, safety, and resilience). Additionally, it has been argued that technology could be used as an equaliser in school achievement levels. In Brunei Darussalam, [†Dhindsa & Shahrizal-Emran \(2011\)](#) highlighted that in tertiary education, interactive whiteboards minimised gender differences in chemistry attainment, where girls' attainment exceeded that of boys. The authors noted the imperative for future research to explore the reverse trends in contexts where girls lag behind boys and the potential for technological solutions to minimise differences. Similarly, in the Philippines, [†Hilao & Wichadee \(2017\)](#) found no gender differences in outcomes, usage, or attitude when examining mobile phones as a language-learning tool for English. This suggests that using mobile phones (and their supported modalities, such as apps or SMS) may help promote gender-equitable literacy outcomes.

Nonetheless, the use of technology in education cannot always promote gender-equitable and positive learning outcomes. Looking at learning loss and the use of EdTech during Covid-19 school closures in Cambodia, [†Bhatta et al. \(2022\)](#) show that while girls were able to outperform boys using distance learning (e.g., girls outperforming boys in Khmer by 11 percentage points), remote learning could not prevent significant learning losses in both numeracy and literacy. Additionally, [†Secreto \(2015\)](#) demonstrates that while the majority (68.4%) of students enrolled in distance learning opportunities offered by the Philippines Open University were female, they had lower achievement levels and longer completion times than their male counterparts. This suggests that distance learning opportunities facilitated through technology are not always positively impactful or equitable.

However, there is significant variation within the Southeast Asian region. In Thailand, no significant difference was found in either the learning outcomes ([†Wongwuttiwat et al., 2020](#)) or acceptance of e-learning ([†Teo et al., 2011](#)) for male and female learners participating in blended or fully online e-learning. These studies suggest that the impact of online learning through EdTech on gendered learning outcomes is highly contextualised and varied throughout the region.

Evidence suggests that technology-facilitated education that appropriately targets girls may increase their employment opportunities (particularly those that are technology-related). In an example from Indonesia, [†Afiani \(2018\)](#) argues that, although gendered norms impede women's and girls' access to ICT, programmes such as 'Girls in Tech Indonesia' have contributed to female economic participation through ICT education. [Figure 3](#) below highlights a case study of how participation in training is made easier for women and girls through online access.

Figure 3. *Participation in online training***Participation in online training**

Using the example of the GIRLS Inspire project in several countries in Asia (though not specifically Southeast Asia), ↑Ferreira (2017, p. 41) identifies areas where women have benefited from the use of online and distance learning (ODL) in secondary and skill-based education. A majority of women who participated stated that the training had a positive impact on their “access to economic opportunities”. They also reported an increase in their “ability to make their own health decisions” and access to resources, as well as in their understanding of their social rights. Solutions like this may be relevant to Southeast Asian countries with similar socio-economic conditions, but more broadly demonstrate the economic and health impacts stemming from education, specifically through ODL.

Girls and women can also utilise EdTech to broaden their employment prospects beyond educational achievement. A significant aspect lies in the acquisition of diverse skills facilitated by EdTech platforms. Through these platforms, individuals can engage in courses that enable them to participate in global career opportunities, including remote work (↑UNICEF EAPRO, 2023).

Moreover, the capacity of EdTech to facilitate flexible learning plays a pivotal role in accommodating the varied responsibilities and schedules of women in the Southeast Asian region. By offering asynchronous learning opportunities, girls and women can seamlessly integrate educational pursuits with existing commitments, be it employment or caregiving duties. For example, phones have been shown to be effective in the Philippines due to their accessibility. ↑Ramos et al. (2007) evaluated a project called ‘Mobile Technology Initiatives for Non-Formal Education’ (MIND) and argued that SMS was a viable solution for increasing English and mathematics skills. In particular, female students identified that SMS enabled them to learn at home in the afternoons and provided the flexibility to juggle learning with additional responsibilities, such as household chores.

Furthermore, the entrepreneurial landscape is being reshaped by EdTech, enabling girls and women to embark on business ventures with greater confidence and competence. Accessible resources and courses in entrepreneurship equip women with the necessary knowledge and skills to navigate the complexities of starting and managing a business effectively. Additionally, the globalised nature of EdTech opens doors to international employment opportunities, transcending geographical

constraints. Through exposure to courses aligned with global standards and trends, women can position themselves competitively in the global job market, thereby expanding their horizons and potential avenues for employment. While this also applies to men, the cultural and contextual restrictions placed upon women in many Southeast Asian countries mean EdTech is opening new horizons that would naturally be more difficult for women to access without technology.

2.2. Equity of access to technology

This section explores the literature on the equity of access to technology in girls' education. Most sources acknowledge that girls are rarely afforded equal access to technology compared to their male counterparts, in particular, due to socio-culturally constructed gender norms and practices that reinforce inequalities. The result of this gendered disparity appears to be an inequitable distribution of educational benefits that come with the use of technology. Three sub-themes emerged in the literature discussing this topic and are discussed below.

- **Unequal access to technology within schools:** It is generally noted throughout the literature that girls tend to have unequal access to technology inside the classroom setting.
- **Unequal access to technology outside of school:** It is noted throughout the literature that girls have unequal access to technology outside the institutional spaces of schools due to gendered household attitudes and roles, cost, and security fears. This limits their access to formal and informal educational content and further impacts their technology experience and literacy.
- **Self-regulation:** Through socialisation and the performative practice of certain gender roles, girls learn to self-regulate their own access to technology.

2.2.1. Unequal access to technology within schools

Most of the literature reviewed suggested that female students have less equitable access to technology at school, but this was rarely evidenced in any substantive way. For example, the [Asian Development Bank \(2022\)](#) argues that girls' opportunities to participate and engage with EdTech in the classroom are limited by cultural values, in addition to female teachers having lower digital literacy levels than their male counterparts. While the literature offered little beyond descriptive qualifications of classroom-based access to technology, learnings from wider low- and middle-income country (LMIC) contexts may help to explain these trends.

See examples around technology access for women and girls highlighted below in [Figure 4](#).

Figure 4. *Technology access in LMICs*

Technology access in LMICs

↑Rubagiza et al. (2011) make the point that girls in low-income countries are more likely to be deprived of opportunities to access technology within schools because they are less likely to consistently attend school in the first place. Both ↑Rubagiza et al. (2011) and ↑Yeba (2012) suggest that girls have less access to technology within the classroom when compared to boys. That said, ↑Yeba (2012) also asserts that unequal access within schools is rarely the result of the unavailability of necessary hardware or infrastructure; rather, it is due to existing and pervasive gendered assumptions about the use of technology. ↑Rubagiza et al. (2011) suggest that teachers can exhibit biases against girls by having lower expectations about their technology competence than their male counterparts. Teachers may also believe stereotypes about which children will enjoy or benefit from using technology, and allocate technology accordingly (↑Pitchford et al., 2019). Because of their different educational expectations, teachers are more likely to encourage male students to take computer or technology-based courses. Girls, on the other hand, are deterred from enrolling in these classes (↑Yeba, 2012).

2.2.2. Unequal access to technology outside school

It is outside the institutional spaces of school that unequal access to technology—and any associated educational benefits—is most evident. Girls may have unequal access to technology outside the classroom due to gendered household attitudes and roles, cost, security fears, and control over their mobility. A study focusing on Indonesia and the Philippines, among other countries, found adolescent boys had a 1.5 times higher probability of owning a mobile phone than adolescent girls and a 1.8 times higher chance of owning a smartphone (↑UNICEF EAPRO, 2023). However, device ownership varied significantly between Southeast Asian countries, which contextually impacts girls' experience of technology and literacy, as well as their informal out-of-school learning (all dependent on device access). Yet other forms of EdTech may be more accessible to girls beyond classroom settings. [Figure 5](#) below demonstrates the role of television in expanding access in the Philippines.

Figure 5. *Gender-responsive TV programming in the Philippines*

Gender-responsive TV programming in the Philippines

In the Philippines, the Department of Education (DepEd) implemented gender-responsive and socially inclusive initiatives on DepEd TV, converting 200 episodes to radio-based instruction and translating 50 episodes into mother tongue languages. Supported by USAID, these efforts prioritise gender components to enhance girls' education. By tailoring content to address gender-specific needs and ensuring inclusivity through language diversity, the programme aims to provide equitable learning opportunities for all students. Through strategic collaboration and targeted interventions, the DepEd TV initiative demonstrates a commitment to fostering gender equality and social inclusion within the education sector, ultimately contributing to the empowerment and advancement of girls' education across the Philippines.

The Covid-19 pandemic sharply exposed the differences in accessibility to technology outside the classroom. For example, despite [†Bhatta et al. \(2022\)](#) reporting that girls in Cambodia performed better than their male counterparts during digital distance learning implemented during the pandemic, not all studies corroborate these findings. [†Tann & Tuy \(2021\)](#) highlighted how females' lower baseline digital literacy and access to technology hindered their academic performance during distance learning at the tertiary level, and more broadly, university closures widened the gender-related digital skills gap for both students and lecturers. The following case study (see [Figure 6](#) below) from Cambodia demonstrates how a workplace-based literacy programme enhanced access for women and girls in garment factories.

Figure 6. *Factory Literacy Programme in Cambodia*

Factory Literacy Programme in Cambodia

The Factory Literacy Programme in Cambodia ([†UNESCO Office Phnom Penh, 2022](#)) is a transformative initiative aimed at enhancing the educational opportunities and empowerment of workers, particularly women and girls aged 15 and above, employed in garment factories. This innovative programme uses a digital learning platform featuring instructional videos to directly deliver basic functional literacy skills to factory workers. By leveraging technology, the programme ensures accessibility and flexibility, enabling participants to learn at their own pace and convenience within the demanding factory environment. Moreover, the initiative goes beyond traditional literacy instruction, incorporating modules focused on educating

participants about their rights, with a specific emphasis on girls' education rights. By empowering female workers with knowledge and awareness, the programme equips them to advocate for themselves and make informed decisions, thereby challenging societal norms and fostering greater gender equality within the workplace and beyond. Through its comprehensive approach to literacy and empowerment, the Factory Literacy Programme serves as a catalyst for positive change, uplifting individuals and communities while promoting a culture of lifelong learning and empowerment.

Other studies beyond the Southeast Asian region (e.g., ([↑Steeves & Kwami, 2017](#))) also note that girls are less likely to have the temporal or financial resources needed to access technology outside school. Girls are often expected to undertake household chores and contribute to the family income much more than boys. More recently, however, ([↑Zelezny-Green \(2018\)](#)) sounded a more hopeful note in her exploration of the role of mobile telephony in enabling more equitable access to technology for girls outside of school. She states that there is an increasing indication from the literature that “girls in the global South access mobile phones after school in ways they choose themselves—sometimes involving formal learning and other times not” ([↑Zelezny-Green, 2018, p. 302](#)). Yet, this gendered difference in accessibility remains a crucial challenge in Southeast Asia, where 20% of girls reported being unable to access devices to participate in online learning during the Covid-19 pandemic ([↑Asian Development Bank, 2023](#)).

2.2.3. Self-regulation

Several studies from beyond the Southeast Asian region indicate that socially constructed gender biases are primarily reinforced by both parents and teachers, and girls come to inhabit these values and self-regulate their use of technology. For example, even in scenarios where girls had the same access to technology as their male peers (inside and outside classroom settings), girls' usage was restricted by a lack of confidence, fear, mistrust, or disinterest ([↑Vilakati, 2014](#); [↑Yebo, 2012](#)). In Southeast Asia, this gendered difference was observed in findings from Timor-Leste. UNICEF's report on girls' digital literacy in Southeast Asia reveals little to no difference between girls' and boys' ability to gain digital skills ([↑UNICEF EAPRO, 2023](#)). However, the research notes that a lack of confidence in the area and gender stereotypes prevented girls in Timor-Leste from pursuing STEM fields or engaging meaningfully with EdTech tools. The report also notes that teaching is largely gender-blind, potentially ignoring the challenges girls face when using technology ([↑UNICEF EAPRO, 2023](#)).

Globally, literature highlights that in other instances, girls may feel uncomfortable in online spaces and are wary of visiting certain websites without prior knowledge of what would be on them. For example, [↑Zelezny-Green \(2014\)](#) observed reticence from some girls towards using mobile phones, as they had previously seen them being “used inappropriately for social purposes” ([↑Zelezny-Green, 2014: p. 71](#)). In the Southeast Asian context, a study with adolescents in Indonesia, Malaysia, the Philippines, and Thailand, found that girls accessing the internet experienced gender-based risks, which included being body-shamed receiving and unwanted sexual advances ([↑UNICEF EAPRO, 2023](#)). Additionally, adolescent girls in Indonesia, Malaysia, the Philippines, and Thailand reported feeling less safe online than boys ([↑UNICEF EAPRO, 2023](#)). These factors could increase reticence among girls to enter specific online spaces, impacting how or if girls are willing to use EdTech for learning purposes.

2.3. Digital ecosystem readiness

This final subsection considers the literature on the readiness of systems and infrastructure in Southeast Asia to use technology to improve girls’ education. We note that due to the absence of information specific to Southeast Asia, we have supplemented the literature from Southeast Asia with findings from other LMIC contexts, where the learnings are likely to apply to the Southeast Asian region. Two sub-themes emerged and are discussed below.

- **Teacher training and professional development:** The most consistently mentioned challenge in this area is a general lack of qualified teachers and ongoing professional development training, in parallel with a specific lack of training in technology use and gender-responsive teaching. However, technology may represent a viable solution to overcome gaps in professional development.
- **Policy and government buy-in:** A key impediment mentioned in studies is the lack of political will and/or clear mechanisms to implement existing policies which advance the use of EdTech and promote girls’ education. While such policies exist in Southeast Asia, they are not always fully implemented or effective.

2.3.1. Teacher training and professional development

The literature consistently emphasises the crucial role of teachers in improving standards of teaching and learning, irrespective of technological

advances: “educational tools and technologies will continue to improve; nevertheless, teachers, not technology, will determine the quality of education in the foreseeable future” (↑[Saxenian, 2012](#)). Most studies from around the world highlight a lack of well-trained teachers as a key obstacle to improving the quality of educational provision (e.g., ↑[Ezzeh & Okoh, 2019](#); ↑[Kinyanjui, 2016](#)). The studies refer to a lack of qualified teachers, the poor quality of teacher training and ongoing professional development, and the limited use of technology within much of current teacher training.

In Southeast Asia, a lack of quality teacher training and professional development also seems to have limited the use of technology in both training and learning settings. In Indonesia, a study found that teachers at the primary and secondary levels did not receive sufficient training to equip them with the pedagogical knowledge needed to successfully develop or utilise ICT learning materials or incorporate ICT into teaching various school subjects (↑[Mailizar, 2018](#)). Similarly, an online survey by UNICEF revealed that 64% of teachers in Cambodia and 63% in Timor-Leste reported not receiving training on digital devices or the internet (↑[UNICEF EAPRO, 2023](#)).

Furthermore, despite the large number of female teachers in Southeast Asia (↑[UNESCO, 2020](#)), they are underrepresented in STEM. Several gender mainstreaming policies have been adopted across the region, but there is a gap between policy and implementation (↑[Rubin & Utomo, 2022](#)). Within this, it is noted that gender-responsive pedagogies and the integration of empowering approaches for female learners can be particularly difficult to roll out to teachers across Southeast Asia comprehensively. This is because of pre-existing constraints and variations in the formative and continuing professional development cycles for teachers.

Increasingly innovative technology-enabled methods are being created to ensure that girls continue to receive an education even when there is a lack of teacher training in Southeast Asia. For example, in Vietnam, ↑[UNICEF \(2020\)](#) highlights a pilot programme for scaling gender-responsive STEM education using Augmented and Virtual Reality (AVR) solutions in mountainous areas to supplement teachers’ low levels of access to STEM training. The theory is that AVR will support marginalised girls’ STEM learning through gamification and immersive interactive experiences. As of 2023, this programme has reached 30,000 girls and boys in the first cohort of pilot schools (↑[UNICEF, 2023](#)). ↑[UNICEF \(2020\)](#) argues that introducing innovative digital education solutions (such as AVR) can help reimagine classrooms, particularly remote areas with limited capacity for teaching STEM, to improve STEM outcomes for marginalised learners, including girls across the region, more broadly. Technology, therefore,

represents a critical tool that could help overcome gaps in teacher training across the region.

2.3.2. Policy and government buy-in

Having a supportive policy environment and framework at the national level was identified by many global studies as a crucial factor in the successful integration of technology into education systems, and in particular, in enhancing girls' access to education (e.g., [↑Ezzeh & Okoh, 2019](#); [↑Kinyanjui, 2016](#); [↑Okudi, 2016](#); [↑Steeves & Kwami, 2017](#)). While most countries do have laws, institutions, and policies to promote technology usage and eradicate gender bias in education, implementation is often weak due to a lack of political will or precise mechanisms to implement constitutional gender provisions ([↑Kinyanjui, 2016](#)). [↑Okudi \(2016\)](#) suggests that some of these policies are often developed to fulfil international obligations rather than because they represent a key government priority, pointing out that numerous policies and initiatives to support girls' education have little impact on gender divides.

In Southeast Asia, measures to ensure inclusivity are not always in place in government programmes. In Timor-Leste, [↑Chainey & Cassity \(2021\)](#) examined the implementation of the new primary school curriculum, which included school leaders receiving a tablet uploaded with the curriculum and lesson plans. Although teachers reported testing various methods to encourage both girls and boys to engage equally with lessons, promoting gender inclusivity was identified as an issue. The authors suggest increased data tracking could facilitate decisions that make teaching practices more inclusive.

Global studies which evaluated the One Laptop Per Child project suggest that integrating gender into technology policies had often been hampered by a lack of political will, with these policies eventually sidelined or not seriously pursued (e.g., [↑Steeves & Kwami, 2017](#)). In addition to a lack of political will, some studies ([↑Ezzeh & Okoh, 2019](#); [↑Okudi, 2016](#)) cite a lack of coordination and integration between different government departments and multiple stakeholders as a limiting factor in the usage of technology to improve girls' education.

In the Southeast Asian region, [↑Pruet et al. \(2016\)](#) discuss the Thai government's 'One Tablet Per Child' initiative, where 800,000 tablets were distributed to Grade 1 students in 2012. Using data collected through questionnaires, they found that both boys and girls enjoyed using the tablets and had similar previous experiences of using technology. This suggests that personal learning experiences may contribute to the needs of female learners in ways that traditional education hasn't, and this may

be worth consideration by policymakers. In addition, while gender-inclusive policies for education exist in the region, they are often not fully realised, as discussed in [Figure 7](#) below on gender mainstreaming in Cambodia.

Figure 7. *Gender mainstreaming policy in Cambodia*

Gender mainstreaming policy in Cambodia

The Royal Government of Cambodia has developed and updated a Gender Mainstreaming Plan in Education to address barriers and challenges faced by girls to access high-quality educational opportunities (↑Ministry of Education, Youth and Sports—Kingdom of Cambodia, 2021). The plan is designed with the vision of eliminating gender disparities, with particular emphasis on ensuring equal access to quality education at all levels. It proposes interventions to increase the participation of girls in schools. The plan also includes strategies to develop positive social attitudes towards girls' education. The existence of such a document acts as a catalyst for relevant stakeholders across Cambodia to work together to develop interventions to empower girls' access to high-quality education and champion their participation in various arenas. However, despite the existence of such plans, Cambodia ranks poorly (144 out of 189) among other countries in the Gender Inequality Index, and social norms and cultural perceptions prevent girls from completing their education.

3. Synthesis and conclusions

In Southeast Asia, unlocking the full potential of female students in technology-enabled education holds promise for fostering their engagement, empowerment, and overall well-being. However, significant barriers persist, hindering girls' access to technology and its benefits. This rapid evidence review has explored the complexities surrounding gender disparities in technology access and the implications for girls' education in the Southeast Asian context.

The following are five key findings from the main discussions in the previous sections.

Key Finding 1: Access to technology can open up opportunities in both education and employment for girls in Southeast Asia. The use of EdTech to provide flexible learning arrangements plays a pivotal role in accommodating the varied responsibilities and schedules of women and girls in the region. By offering asynchronous learning opportunities, women and girls can seamlessly integrate educational pursuits with existing commitments, be it employment or caregiving duties. Additionally, engagement in ICT initiatives and programmes positively contributes to women's economic participation by developing transferable digital skills. Therefore, it is likely that increased opportunities for ICT education and flexible learning targeted at girls will provide impetus to further develop their opportunities to participate in technology-related employment, although success will also depend on complementary measures to remove other gender-related barriers. The following case study ([Figure 8](#) below) highlights such opportunities for out-of-school girls in Uganda and Kenya.

Figure 8. *Skill-based boot camps in Uganda and Kenya*

Skill-based boot camps in Uganda and Kenya

The organisation Educate! offers skills-based boot camps in Uganda and Kenya to equip out-of-school youth with the skills to transition to employment successfully. Educate! is piloting 'boot camps' focused on out-of-school girls. The overarching goal of the programmes is to enhance and build alternative employment pathways aligned with strategic sectors and informal economy business models. The programme enlists distance learning models that include virtual 'boot camps' and training. SMS and smartphones are used to monitor the impact of the programme. Additionally, Educate! has developed an online mobile platform for skills development.

Key Finding 2: A significant gender digital divide still exists in some Southeast Asian contexts, influenced by cultural biases and gendered assumptions. This limits girls' access to technology, despite generally equal access to education. Girls face substantial obstacles to accessing technology and technology-enabled education compared to boys. Gender biases prevalent in society and education systems contribute to a significant digital gender divide, with girls having less access to technology than boys. When girls do have access to technology, their use of devices often differs from that of boys, often due to gendered differences in device functionality, digital literacy, and ways of navigating online content and risks. Concerns about teacher training, professional development, and systemic issues with curricula and pedagogy underscore the need for comprehensive reforms and gender-responsive methodologies to address gender disparities in technology access and education. Moreover, the literature highlights how internalised gender beliefs due to socialised gender norms and lack of female role models may lead girls to self-regulate their technology use, further perpetuating inequalities. See the following example from Cambodia ([Figure 9](#) below).

Figure 9. *Gender-related radio in Cambodia*

Gender-related radio in Cambodia

'Women's Radio FM 102' in Cambodia is a free radio programme available nationwide, even in the most rural areas. The programme is designed to educate and inform Cambodians on women's rights and health issues, including domestic violence, HIV/AIDS awareness, and poverty alleviation. Studies have indicated that exposure to the radio programme has positively affected gender-related attitudes (†Rui & Upadhyay, 2022, p. 10). This demonstrates how technology can be leveraged to address existing cultural biases and gendered assumptions.

Key Finding 3: Parents and teachers play crucial roles as gatekeepers to girls' access to technology. This highlights the importance of parental and teacher involvement in programme development and training, particularly those that address embedded sociocultural gender expectations. Outside of school, girls in Southeast Asia encounter barriers to technology access, including gendered household attitudes, cost constraints, and security concerns. Within classrooms, teacher biases, low digital literacy, and assumptions further limit girls' opportunities to engage with technology, perpetuating stereotypes and divisions, with girls often learning more digital competencies from peer-to-peer learning or self-learning due to parents' and teachers' low digital literacy. These factors not only limit girls' access to educational content but also shape their

technology experience and literacy. Parents' and teachers' low digital literacy can also lead to them gatekeeping access to online content, preventing girls' from being able to learn to navigate online spaces safely. See the illustrative example of engaging caregivers in Kenya below (Figure 10).

Figure 10. *Engaging caregivers in Kenya*

Engaging caregivers in Kenya

Keep Kenya Learning (KKL) is an initiative designed to support caregivers with the information and resources they need to support learning at home (†Mbatha et al., 2021). The initiative recognises the keen roles that caregivers play in the successful learning of children, and therefore seeks to provide caregivers with the skills and knowledge needed to best support learning at home. This is especially important when considering blended or distance learning approaches that require learners to do some amount of learning at home. KKL engages caregivers through SMS and smartphones, thus also building digital skills and enhancing familiarity with digital devices as a learning tool (†Kimathi et al., 2021).

Key Finding 4: Governments and other education providers should explore diverse technology options, such as mobile phones, to overcome gender barriers and infrastructural challenges, fostering inclusive learning environments for girls.

The lack of attention to differences in technology access among different groups of girls and the focus on traditional devices like computers and tablets overlook the potential of more diverse and accessible technologies, such as mobile phones and radios, to bridge the digital divide. It was found that mobile phones are underutilised in classroom teaching and learning, whereas girls in the region have demonstrated greater familiarity with such devices. For this reason, mobile-phone-based learning programmes and systems may represent an appropriate modality with which to target girls through technology. [Figure 11](#) below gives a relevant case study from the Girls' Education Challenge project in Nepal (funded by the United Kingdom's FCDO).

Figure 11. *Girls' Education Challenge in Nepal***Girls' Education Challenge in Nepal**

During the Covid-19 pandemic, various Girls' Education Challenge projects across Nepal took stock of whether girls and their families had access to technology such as phones, radio, or the internet and explained how effective the use of these modalities would be for educational delivery. It was found that girls tended to have limited and inconsistent access to technology, and in response, the projects deployed a multi-modal delivery approach, which included radio, telephone calls, self-learning packs, and small-group learning (↑Rui & Upadhyay, 2022).

Key Finding 5: More targeted and high-quality research is needed across Southeast Asia to better leverage EdTech to support girls' education. This is especially important given that girls still lag behind boys regarding returns to education, employment, and well-being. This continues to be the case despite girls reportedly having higher rates of enrolment in education and outperforming their male counterparts in several instances. There is a need to understand the nuances behind such results. Additionally, further research is needed to explore the potential of technology to support gender-responsive pedagogies and teacher training initiatives. Furthermore, there is a critical need to address safeguarding issues specific to girls, ensuring their safety and well-being in the digital age. This should also be considered alongside boys' safety, which is often overlooked in policy and research (↑UNICEF EAPRO, 2023). Governments and stakeholders must prioritise inclusive and equitable access to technology-enabled education for all girls in Southeast Asia through both policy and implementation of training and learning opportunities.

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Annex A. Search strings

- (“education technology” OR EdTech OR “distance learning”) AND (“Girls Education” OR “gender responsive” OR “gender equality” OR “girls schooling”) AND (Brunei* OR Vietnam* OR Cambodia* OR Indonesia* OR Lao* OR Malaysia* OR Burma OR Philippines OR Singapore* OR Timor* OR Thailand OR “ASEAN”)
- (“mobile learning” OR EdTech OR “digital learning” OR “Mobile learning” OR “digital education” OR ODL) AND (“Girls Education” OR “gender responsive” OR “gender equality” OR “girls schooling”) AND (Brunei OR Vietnam OR Cambodia OR Indonesia OR Lao OR Malaysia OR Burma OR Timor OR Philippines OR Singapore OR Thailand OR “ASEAN”)