



LEARNING BRIEF

#05

How Can Decision-Makers Assess EdTech Interventions for Cost-Effectiveness to Enable Better Investments?

EdTech^{Hub}

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[The EdTech Hub Learning Brief Series](#) provides practical resources for people working to improve how technology is used in education. The briefs are specifically designed to help busy decision-makers working in low- and middle-income countries.

The Learning Briefs each address a specific technical question. Each one explains why the question matters, provides insights to help with effective decision-making, and identifies issues that require further work. They are based on practical evidence generated through the work of EdTech Hub and from across the sector.

We want to make EdTech evidence accessible so that it can be used to improve both policymaking and implementation.

Please [contact EdTech Hub](#) to share your ideas for new Learning Brief topics which would help you in your work.

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Why this question matters

As education decision-makers (policymakers, donors, researchers, and others) increasingly look to EdTech tools and interventions to help catalyse impact on education outcomes, cost-effectiveness is among their most important concerns. Put simply, cost-effectiveness has been defined by EdTech Hub as “a figure that categorises how much an intervention will cost to deliver a specific level of impact over a given length of time.”¹ As such, it is derived from both the **costs** associated with the dissemination and implementation of EdTech, as well as the **outcomes** that this applied intervention directly or indirectly contributes to.

Calculating cost-effectiveness is particularly important for decision-makers as they navigate how to maximise the impact of scarce resources available for investment.² Cost-effectiveness analysis should be used to compare specific initiatives against one another and, taking into account contextual nuances, help guide implementation and procurement decisions to improve learning outcomes in ways that are affordable.³

While this is true for stakeholders across sectors, cost-effectiveness is particularly important for those considering EdTech investments in low- and middle-income country (LMIC) contexts for the three reasons outlined below.

Spending on EdTech is on the rise, while resources for education in LMICs remain too low

Education investment in LMICs remains significantly below those of higher-income countries, and in many countries, budgetary commitments to education have declined over the last several years.⁴ This is problematic given the depth of the learning crisis in many LMICs, which has recently been worsened by the Covid-19 pandemic (learning poverty in LMICs increased from 57% pre-pandemic to 70% in 2022).⁵ Meanwhile, investments in EdTech in those same countries are expanding fast, driven by

a multitude of factors, including political pressure on ministries of education to innovate and make rapid improvements, often without a focus on evidence and impact.⁶ As captured in the recent UNESCO Global Education Monitoring report focused on technology: tech tools are often brought in to “plug in gaps” without enough consideration given to the longer-term costs for national education budgets.⁷ This entails a significant risk that spending on EdTech without robust evidence on its effectiveness takes up a disproportionate share of education budgets while failing to provide adequate impact.⁸

Determining the cost and impact of EdTech interventions, and comparing them, is not straightforward

When it comes to calculating the cost-effectiveness of EdTech, both the cost and the impact sides of the equation are complex. There are particular aspects of EdTech interventions that make them uniquely challenging to cost and compare across contexts, these include: cross-sector components, complex infrastructure investments, “hidden ‘baseline’ costs”—core contextual components needed for an intervention to succeed that precede the intervention—and strong incentives for rapid scale and growth.⁹ Stakeholders providing, implementing, or procuring EdTech may also not be well-versed in aggregating or sharing adequate cost data, and as a result, may fail to truly capture the true entire cost of an intervention.¹⁰ Sometimes, this will be due to the technical complexity of the challenge, and other times it will be because a certain stakeholder is actually incentivised by not calculating costs and making that information available to inform decision-making. Attributing specific impact on learning outcomes to an EdTech intervention and comparing that impact across contexts is also very challenging,¹¹ and while there has been significant movement towards the standardisation of learning

outcome measures in education, including efforts to harmonise learning data across countries,¹² inconsistency in learning outcome measurement and data still hinders our ability to make a full and fair comparison of cost-effectiveness between interventions.¹³

Cost-effective investments are crucial to ensuring that the impacts of EdTech in LMICs are positive

Realising the promise of EdTech in addressing global learning poverty is only possible through interventions that are cost-effective and contextually relevant.¹⁴ EdTech Hub views improving

cost-effectiveness analysis as crucial to its goal of ensuring evidence can inform decision-making in how technology is used in education. To this end, we have produced two Cost-Effective EdTech Position Papers, the first on ways the sector can [make progress](#), and the second focused on [good practice](#). The intention is that these, along with this brief, will help to raise awareness about the importance of cost-effectiveness in EdTech and provide practical guidance for decision-makers to engage further in cost-effectiveness analysis when making decisions on their technology investments.

Key insights to improve practice

Use cost-effectiveness metrics to compare EdTech against non-tech interventions

When considering the large-scale implementation of technology tools in education, a crucial question for decision-makers is not simply which technology tool to use, but whether any use of technology compares favourably to a non-tech approach to achieve the same desired outcomes. In other words, instead of focusing only on comparing tech-based initiatives against one another, stakeholders should also ensure they consider any promising education interventions that share an overarching objective in a given context.¹⁵

Comparing the gains of programmes with and without tech components can yield important insights. For instance, in the case of the PRIMR programme in Kenya, an original “base program” consisting of non-ICT components (including head teacher training, full-colour books for each learner, as well as teacher guides aligned with the student books and additional instructional support) was evaluated against two “ICT-interventions”, which separately added

tablets and e-readers to this base. Ultimately, it was found that while the use of ICT technology did lead to improvements in learning outcomes, it did not produce literacy outcomes significantly higher than non-ICT programmes.¹⁶

Comparing EdTech tools against non-tech interventions with demonstrated impact and against each other enables education decision-makers to more rigorously determine whether procuring technology is an optimal and cost-effective solution within any given scenario. This shift would help ensure more affordable, impactful, and sustainable approaches to education challenges are prioritised.

When costing, calculate the total cost of implementation (TCI), and account for variances in cost over the lifespan of implementation

Costing the total cost of EdTech in a particular context is not as simple as calculating the cost of the devices provided. Effective technology implementations require a wide range of expenses, some

obvious and others less so. And yet, as demonstrated by a review of impact evaluations of education programmes, the lack of information sharing on costs is widespread across the sector. Most do not share information on cost data, and those that do only tend to report on the “largest cost ingredient”¹⁷ of a programme, leading to underestimation of programme costs.¹⁸

The total cost of implementation (TCI) — previously Total Cost of Ownership (TCO) — is a term often used to represent all the costs associated with an EdTech intervention, including set-up, implementation, maintenance, sustainability, and monitoring.¹⁹ EdTech programmes often require infrastructure investments, training, recurring costs associated with keeping devices active (particularly electricity and connectivity charges), maintaining them, updating them, and tracking and monitoring their usage. It is also crucial to account for the ongoing contractual costs of software licensing from technology providers.²⁰

EdTech intervention costs are also not consistent over a programme’s lifetime. For instance, EdTech interventions often require significant up-front investments in infrastructure, devices, and training, while maintenance costs are likely to be initially slow but rise significantly over time. Economies of scale might also lead to shifts in overall costs: a decrease in costs per child is often expected as programmes grow.

The same is also true of the impact side of the cost-effectiveness equation: implementers should not make assumptions about immediate impact, especially when new technology is being introduced; its effect on education outcomes may grow. It is for these reasons that Chuang et al. recommend implementers conduct cost analysis for different stages of scale-up and implementation, focusing on both the short and long term.²¹

Finally, considering the cost-effectiveness of EdTech, the financial costs of an intervention, those associated with direct programme expenditures, and economic costs should all be considered. Economic costs should also include societal opportunity costs based on education investments not made with the resources invested in an EdTech initiative.²²

It may seem like a daunting task, but it is a sensible investment of effort to undertake a thorough cost calculation that incorporates each of these factors. Accounting for the true total cost of EdTech programmes can enable decision-makers to more rigorously consider the overall affordability of those programmes (i.e. make decisions around how the total cost fits within the context of their own budget) and, as a result, be in a better place to make procurement decisions that are likely to have a sustained impact on learning.

Multiple tools to help with this work are available, as outlined in the section below.

Work in alignment with existing frameworks and tools for cost-effectiveness calculations

As decision-makers consider the cost and relative impact of EdTech interventions in their procurement decisions, a number of existing frameworks and tools are available to use. Anyone working on the cost-effectiveness of EdTech should align their considerations with these frameworks as much as possible, and also contribute to developing them. This is significant because increasing the capacity of decision-makers to make cost comparisons between different technology offerings in education requires increased methodological consistency in how costs are calculated. The paragraphs below introduce three particularly useful resources. For a more detailed analysis of these and other frameworks, please refer to Mitchell and D’Rozario’s position paper on cost-effectiveness cited throughout this brief and included under [Resources](#).²³

1. World Bank Learning-Adjusted Years of Schooling (LAYS) and Strategic Impact Evaluation Fund (SIEF) cost approach

Among the most significant cost-effectiveness challenges faced by education decision-makers is the lack of comparable impact data across education interventions. With this challenge in mind, the World Bank developed a standard metric to combine data on the quantity and quality of education — leveraging established international learning assessment data, to express education impact in terms of Learning-Adjusted Years of Schooling (LAYS).²⁴

The intention is that this provides an impact framework whose metric (when broadly adopted) can allow for cross-country comparisons of education interventions.

The World Bank has also codified a costing model, which could be combined with the LAYS impact framework in cost-effectiveness calculations through their Strategic Impact Evaluation Fund (SIEF).²⁵ This model calls for intervention-specific cost data to be collected throughout a programme, and disaggregated by programme inputs. SIEF has developed [practical guidance](#)²⁶ as well as [templates](#)²⁷ for this cost model, which practitioners can adapt when assessing an intervention's cost.

EdTech Hub believes that more widespread uptake of a metric like LAYS and a standardised cost framework like SIEF's by policymakers can help increase the availability of comparable data on cost-effectiveness across programmes. However, there are some limitations to this combined approach: for instance, comparable learning data is still not available from many LMICs.²⁸ Similarly, while the SIEF cost model is a helpful resource, its focus on continuous cost data collection throughout a programme's lifecycle can be time-intensive and less valuable when focused on the design and procurement phase of cost-effectiveness analysis.

2. Building Evidence in Education (BE²) cost-effectiveness approach

The Building Evidence in Education (BE²) working group promotes effective and consistent research practices across education funders, including the UK Government's Foreign, Commonwealth and Development Office (FCDO), UNICEF, and USAID. They have developed a framework and [detailed guidance](#)²⁹ on costing education programmes, including a cost-effectiveness approach. This framework proposes an "activity-based" costing method, where an activity is defined as "any event, unit of work, or task with a specific goal, such as teacher training, developing or producing books or other learning materials, or undertaking a learning assessment."³⁰ It advocates for the design of a framework for data collection to be designed ahead of a programme's implementation, and for this

data to be captured in real-time once the programme is being implemented. On the impact side of the equation, BE² does not require the standardised LAYS framework, but rather asks for credible estimates of a programme's impact, using and referring to context-specific data.³¹

3. The Brookings Institution Childhood Cost Calculator

In 2023, The Brookings Institution launched its [Childhood Cost Calculator \(C3\)](#),³² which aims to make the costing of interventions targeting children and youth (including education, nutrition, health, social protection, etc.) simpler for implementers and policymakers. The tool takes the user through a number of forms, each one collecting information about different aspects of the relevant programme. Information is broken down into direct vs indirect costs, and the forms also capture resource types such as personnel, materials, and travel among other things.³³

The tool is meant to be used by an informed individual from the education programme being costed, and The Brookings Institution recommends undertaking a consultative process to capture any data that cannot be accessed prior to completing all forms.³⁴ The tool does not consider the outcomes of the intervention, and therefore cannot provide a full cost-effectiveness analysis. It could, however, prove useful across the implementation lifecycle, including the programme design phase (making it helpful in determining the programme's affordability), during and post-implementation. The tool is a valuable contribution — it provides programme implementers a relatively easy-to-use framework for structuring their cost estimates.

Require detailed, context-specific data from EdTech providers on cost and outcomes from proposed implementations

Education decision-makers should request detailed, disaggregated, and context-specific cost data from EdTech providers prior to investing in a specific product or

intervention. EdTech interventions can be costly, multi-year investments, and increased cost transparency between all stakeholders is crucial for ensuring mutual benefit.

Obtaining data on anticipated outcomes is an important way for decision-makers to decide between the offerings of different prospective EdTech providers. If an EdTech provider is asserting that their inputs can lead to meaningful improvements to key education outcomes at scale, they should have evidence of this impact to back up the claim. As much as possible, this should include data on anticipated improvements in learning outcomes. However, decision-makers also need to consider what other relevant outcomes (teaching quality, etc.) might be anticipated as a result of the implementation, and they will require data on these outcomes as well. In order to be useful to decision-makers, cost data needs to be explicit about the level of certainty, and whether the impact is direct or indirect, fully attributable to the intervention, or only one contributing factor within a more complex system. The data also needs to be presented in relative terms—calibrated to represent the specific setting where the benchmarking impact was achieved and how this may differ from the target setting for a new investment.³⁵ This does not mean that every EdTech investment must be ‘proven’ to be effective in a new context, but that before making significant and long-term investments of limited financial resources, decision-makers should be able to make reasonable deductions about likely impacts on their outcomes — on the basis of reported data.

Given the increasingly competitive and crowded EdTech marketplace today, tech providers may not have the incentives to report on the holistic cost of their interventions up-front. Pricing models designed to maximise sales rather than prioritise accurate TCI may lead to hidden costs on indirect components such as maintenance, training, licensing, and other important wrap-around implementation services.³⁶ With this in mind, decision-makers should specifically ask for data on things like the expected life cycle of a product, licensing and subscription costs for both the short and long term, and other potential costs, which

may be cyclical in nature. This will likely require some persistence and formalisation as a default requirement within a procurement process.

Cost data becomes increasingly valuable for decision-making when disaggregated to whatever extent possible. Disaggregation enables decision-makers to understand how costs are broken down by category (labour, materials, etc.) to predict how similar costs might feature in their context (where they will have a better awareness of actual costs) and throughout a programme’s implementation. Context-specific estimates are crucial to ensuring the accuracy of cost-effectiveness calculations. For example, a costing analysis of education interventions across countries found that contextual differences in cost on even one “ingredient” of a programme (in this case, community teacher salaries) led to variations of up to 88% in the cost-effectiveness of interventions across contexts. The impact of context-related cost variations like this is greater in interventions with a larger range of cost ingredients.³⁷

Finally, decision-makers should also consider that costs to implement EdTech are likely to be higher in marginalised contexts.³⁸ Data shared by prospective EdTech providers might be sourced from implementations targeting ‘easier-to-reach’ learners. Any decision-maker interrogating cost data from providers should ensure that the data provided can be meaningfully compared to the context within which the actual implementation will take place.

Striving to obtain more fully contextualised and accurate cost data will ultimately enable governments to more accurately assess which EdTech programmes are likely to represent appropriate and cost-effective approaches.

Consider the broader financial viability: Even if cost-effective, not all EdTech interventions are affordable

In terms of finances, education systems in LMICs are significantly under-resourced, and it is therefore crucial that decisions about EdTech investments are made not just on

the basis of cost-effectiveness considerations, but also in relation to affordability within the specific operating context. Affordability implies understanding cost-effectiveness within the context of available funding. With this in mind, affordability needs to be defined as the ability of an education system to finance a given intervention at scale, long term, in a way that is appropriate relative to other existing priorities.³⁹

Affordability is where cost-effectiveness calculations and scaling aspirations need to connect in practice. Even interventions that deliver cost-effective impact at a certain cost per student may not be financially feasible at scale given the existing resources available.⁴⁰ This is why understanding TCI is crucial to making sure the full budget commitment of an EdTech intervention is feasible. One way to benchmark affordability can be to assess the cost of an EdTech intervention against

the discretionary spend per child within the national education system.

Determining an intervention's affordability also includes considering the long-term financing required to maintain it and assessing the extent to which an intervention can be self-sustaining in the long term, without depending on costs being covered by other government or donor programs.⁴¹ This is a highly contextual determination which also depends on understanding the national objectives related to digitalisation (including beyond education) and the anticipated development of tech infrastructure: the cost of EdTech interventions can change significantly if broader investments in the tech ecosystem are made, making the question of affordability something that requires regular re-assessment.

Areas for further exploration

Improving comparability, transparency, and accountability in EdTech cost-effectiveness analysis

Decision-making around EdTech investments in LMICs takes place within specific political economies. Education decision-makers need to have the right tools and data to make evidence-based decisions, even while in a political environment that may push and pull them in different directions because of competing pressures and priorities. EdTech Hub's approach to cost-effectiveness in EdTech focuses on how to equip decision-makers with tools to help them make effective decisions and build a culture of transparency and accountability around how to calculate and communicate costs and anticipated impacts.⁴² For these reasons, the Hub's 'nine principles for cost-effectiveness'⁴³ in EdTech hinge on promoting practices that allow for more comparability and transparency across

EdTech data. This includes promoting the use of standardised impact metrics like LAYS, which, if adopted broadly, can allow for faster cost-effective decision-making across LMICs and the analysis of cost-effectiveness frameworks and tools like those developed by SIEF and BE², and The Brookings Institution Cost Calculator tools.⁴⁴ But these tools and metrics are still used inconsistently, and many require significant effort from implementers, making quality cost-effective analysis still largely unattainable.

EdTech Hub's approach also includes advocating for transparent information sharing around costs, including accounting for often 'hidden costs', in order to ensure public-private EdTech partnerships lead to mutually beneficial outcomes for all stakeholders. There has been some progress on this, inspired by a broader push for open data in the development sector.⁴⁵ Investing in targeted efforts to embed higher standards and expectations in cost-effectiveness analysis, and establishing them as a 'new normal' for effective

decision-making within EdTech could lead to an outsized impact on the sector.

Integrating equity and sustainability considerations into cost-effectiveness calculations

The discourse on cost-effectiveness to date tends to focus on costing vis-à-vis basic improvements to learning outcomes. However, significant equity and sustainability considerations are not yet adequately included in these calculations.

If programmes intend to reach all learners, then equity considerations must be fully incorporated into cost-effectiveness calculations. One way to centre equity is to focus on learning outcomes for those most marginalised learners, a practice which could lead to a programme that is more responsive to the needs of all learners.⁴⁶ There is also potential to tackle equity by refining standardised learning metrics. Work to develop an equity-based coefficient to be included in the LAYS process is currently underway. This would result in something similar to what has been achieved in the context of healthcare with Quality-Adjusted Life Years (QALY).⁴⁷ Incorporating an equity coefficient for marginalised learners will help demonstrate the relatively greater value to their learning outcomes with each cost unit. While the exact quantification of this requires more data, if it can be accepted in a health context that, for example, visual impairment results in a quality-of-life adjustment of 0.6 (i.e., 1 yr = .6 QALY for that individual) then applying a similar adjustment to the LAYS score of visually impaired students will reflect the differential benefit of additional learning.

In the long term, this equity adjustment would allow for cost-effectiveness approaches that acknowledge the additional cost of catering to marginalised learners,

while demonstrating the relatively greater benefit they gain from additional education. Similarly, efforts to account for the environmental costs of education interventions could also be considered; adjusting for sustainability as a factor in cost-effectiveness analysis. This is especially important for EdTech interventions, which can produce massive amounts of e-waste and consume significant energy levels. While efforts to incorporate these important factors are being considered, they will need to be tested and used in order to determine whether they should be standardised across cost-effectiveness analysis.

Developing better insights regarding the barriers decision-makers face when using cost-effectiveness tools

As has been articulated throughout the brief, more work needs to be done to give decision-makers the tools needed to adequately consider the long-term sustainability impact of EdTech interventions up-front when procurement decisions are made. Central to achieving this will be ongoing strategic efforts to increase the use of the existing tools and bring them into the mainstream of decision-making. This requires targeted research to understand the specific barriers and constraints that decision-makers currently face when trying to operationalise cost-effectiveness tools (such as LAYS+SIEF, BE², and The Brookings Institution calculator as discussed above) in their work. Increased insight on this, generated through actual use cases, will then make it possible to refine the tools and promote them effectively, along with practical guidance. In combination, such steps could help to gradually establish the use of robust and consistent cost-effectiveness analysis as a default expectation within EdTech decision-making.

Resources

Tools and frameworks for cost-effectiveness analysis

- The Brookings Institution. 2023. 'Childhood Cost Calculator (C3): User Guide. A Costing Tool for Education and Early Childhood Development'. Center for Universal Education at The Brookings Institution. https://childhoodcostdata.org/C3_User_Guide.pdf.
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Resources providing an overview of cost-effectiveness for EdTech

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