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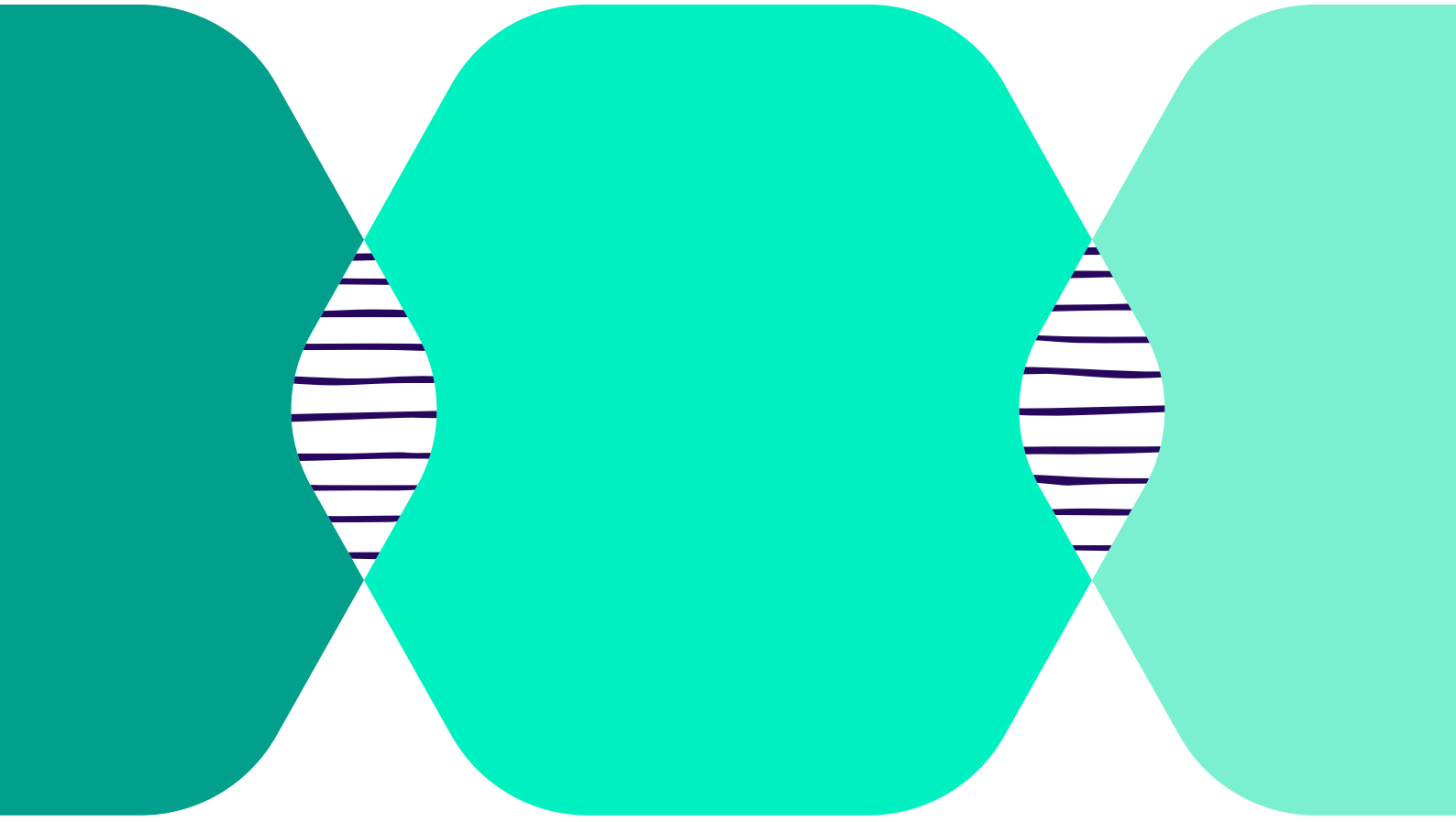
Assessing the carbon footprint of professional development programmes

Summary and recommendations

Jonny D'Rozario, Katrina Barnes and Matt Thomas



www.britishcouncil.org

1 Redman Place

London E20 1JQ

United Kingdom

www.britishcouncil.org

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About Jigsaw

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Part 1

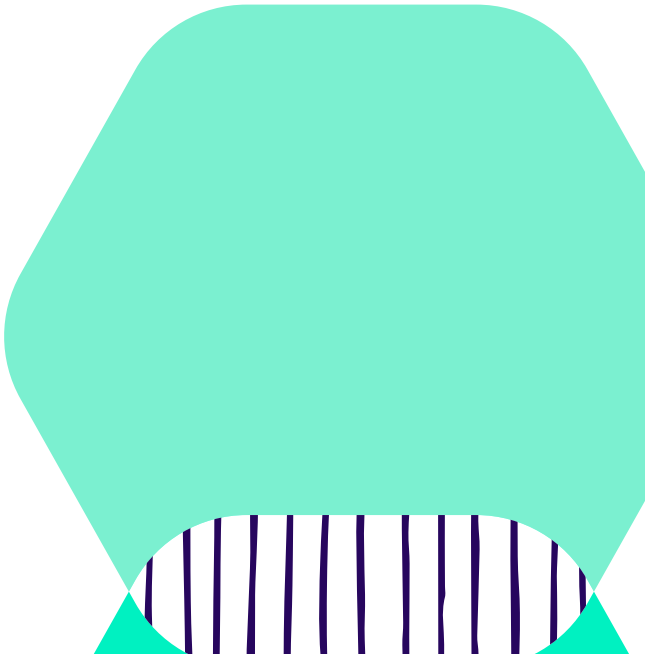
Summary

Background

As the climate crisis becomes increasingly severe, attention is turning to how education programming could become more environmentally sustainable. One aspect of education programming that is currently under-researched is the relative carbon footprint of face-to-face and online delivery models, a greater understanding of which could help organisations shift towards implementing increasingly sustainable programmes. This summary document outlines the findings of a case study examining the carbon footprint of Secondary Teachers English Language Improvement Rwanda (STELIR), a blended teacher professional programme currently being implemented by the British Council, to appraise the relative environmental impacts of different models of delivery and make appropriate recommendations for delivering more environmentally sustainable programming.

The STELIR programme is currently being implemented across 14 districts in Rwanda by the British Council under its partnership with the Mastercard Foundation. The three-year programme is now expected to reach almost 8,000 pre-service and in-service teachers by the time of its conclusion in 2025, although this report is based on figures correct as of May 2024 that the programme would reach 6,700 participants. Each year of STELIR is comprised of three separate components:

- 30-60 hours of intensive face-to-face training
- 60-90 hours of online training
- 5-6 months of school-based continuing professional development



This blended delivery model makes it an ideal case study to comparatively examine and analyse the relative environmental impact of online and face-to-face models.

Existing evidence suggests that online and hybrid models of delivery are more environmentally friendly than their face-to-face equivalents, in particular due to the fact that they reduce the need for travel. However, most of this evidence is not programme specific and is focused on high-income contexts (HICs), with little evidence from low- and middle-income countries (LMICs). Studies have also used an inconsistent range of methodological approaches and standards, meaning data is not directly comparable and broad assumptions on the environmental impact of each mode of delivery should be treated with caution. Generating programme-specific environmental impact data from LMICs is therefore essential to enable those working in these contexts to factor environmental sustainability into their programme decision-making.

Methodological approach

This study outlines an exploratory methodological approach for assessing the carbon footprint of teacher professional development programmes implemented in LMICs, using STELIR as a case study. In light of the methodological inconsistencies within existing studies, the study proposes a framework that could be further used to guide a process of carbon footprint assessment. The stages detailed in the framework are as follows.

1. Scoping and reviewing documentation
2. Data gathering
3. Identifying calculation tools
4. Calculating emissions

The approach involves collating specific operational data that can be combined with existing calculation tools and emissions factors to estimate the carbon footprint of different programme activities. As such, it is aimed at assessing specific programmes, a deviation from most existing methodologies and tools for carbon footprint assessments which are focused at an organisational level. The methodology is also intended to represent a relatively low-effort alternative to resource intensive carbon footprint assessments, so that it can be more easily replicated in low-

resource contexts and by non-specialist users. This removes logistical and financial barriers to assessing the environmental impact of education programmes and encourages greater engagement amongst educational stakeholders in building this particular evidence base. Long term, this will mean that environmental data can be presented alongside other important data points, such as impact on learning and cost-effectiveness, to inform decision-making in the context of education programming. However, generating reliable environmental data from LMIC contexts remains a challenge due to a lack of contextualised data.

Findings

The results from this case study estimate the total carbon footprint across the lifetime of STELIR to be 708,071 kg of carbon dioxide equivalent emissions (CO_2e), including a capital investment in hardware. This total is comprised from the following stages and components: face-to-face training (293,990 $kgCO_2e$, 41.52 per cent of total emissions); capital investment in hardware (280,980 $kgCO_2e$, 39.68 per cent of total emissions); online training (62,600 $kgCO_2e$, 8.84 per cent of total emissions); pre-programme placement testing (58,376 $kgCO_2e$, 8.24 per cent of total emissions); school-based continuing professional development and mentoring (12,126 $kgCO_2e$, 1.71 per cent of total emissions).

When discounting the carbon footprint of the capital investment in digital hardware, face-to-face training is the biggest contributor to the overall carbon footprint by individual stage. By contrast, emissions from online training are much lower, equivalent to only 21.4 per cent of the footprint of face-to-face training. Emissions from face-to-face training are largely driven by the provision of meals, mobile money reimbursements and transportation, whilst over 80 per cent of the emissions of online training result from transportation which is required to attend the face-to-face induction when participants collect their devices, participate in basic digital literacy training and return hardware.

However, a capital investment in digital hardware was required to facilitate online training. STELIR purchased 3,200 tablets, chargers and earphone sets, in addition to replacement items, the manufacture of which resulted in emissions of 280,980 kgCO2e. Including these emissions with the online training component of STELIR would mean it has a higher carbon footprint than the face-to-face component, contributing nearly half (48.52 per cent) of total programme emissions. The significant increase in emissions in this scenario is a reflection of the volume of hardware that is procured in order to implement online training, although the hardware will continue to be used in other projects beyond the lifespan of STELIR.

Reflections and conclusions

While this way of conceptualising and accounting for environmental impact within face-to-face and online models differs from most existing studies, the inclusion of manufacturing emissions for new technology is essential to reflect the nature of education programming in LMICs specifically, where it is necessary to procure new digital hardware to implement online training or learning much more than in HICs. In this context, procuring technology to deliver online training or learning has much more significance in terms of environmental impact than online models that are implemented through pre-existing devices.

Several study limitations mean that caution should be taken when interpreting the results. A lack of available secondary data and the use of proxies for emission factors mean that carbon footprint estimates may not be entirely accurate, although the results nonetheless represent a reasonable indication of the relative environmental impacts of each component of STELIR. In addition, ascribing all manufacturing emissions from new hardware to STELIR is not a true reflection of their use, as the hardware is expected to be used in subsequent programmes implemented by the Rwanda Education Board (REB). It may be more accurate to reduce the manufacturing emissions to a percentage equivalent to the proportion of the device lifetime spent on STELIR, but doing this would prove difficult as the full lifetime of these devices is not yet known. While accounting for emissions in this way is considered a sensible starting point to emphasise the importance of engaging with manufacturing emissions when high quantities of digital technology

are being introduced to deliver activities, readers should be aware that this framing has a strong influence on the results due to the relative significance of the manufacturing emissions.

More data is needed to fully understand the significance of these case study results. The environmental impact of carbon-generating activities should be considered relative to alternatives and other impact data to better understand where opportunities to increase the environmental sustainability of programming may exist. The environmental impact of programme activities should be compared to a 'business-as-usual scenario', that is, the activities taking place (and therefore emissions being generated) even if the programme did not exist, rather than being compared with a zero-emission scenario. While there is not enough data to reliably achieve this at the moment, this kind of analysis will help frame the significance of the environmental impact of programme activities, determining whether they represent a net contribution or reduction in emissions compared to the likely alternative situation.

Furthermore, considering other impact data is critical to identifying appropriate opportunities to improve the sustainability of education programming. Decisions on the nature of education programming in LMICs should not be primarily based on environmental data, as the key priority is impact on learning outcomes. However, environmental data should be used to highlight where opportunities for more environmentally sustainable processes may exist without impacting on learning outcomes. In particular, the different benefits that can be offered by both online and face-to-face training, and their use as complementary tools, should be considered alongside environmental data when deciding on which delivery models to use.

While more research is needed to establish whether the logic around face-to-face and online models derived from this study can be applied to other LMICs beyond Rwanda, it is hoped the methodological contribution of this study could be most useful in similar LMIC contexts. This relatively low-intensity approach provides reasonable estimates of emissions, with any additional accuracy gained from more intensive approaches unlikely to alter the high-level learnings around environmental impact generated by this study. As such, the fact that this approach requires fewer resources should mean that it is more widely accessible and applicable, and does not demand a diversion of resources away from delivering impact on learning outcomes.

Therefore, it is of critical importance that LMIC-based research continues to build on this case study. When more context-specific evidence is available, decision-makers will be able to regularly and confidently determine the relative environmental impact and sustainability of different models of education delivery in LMICs.

Part 2

Recommendations

Calculating the Secondary Teachers English Language in Rwanda (STELIR) programme's carbon footprint has enabled the research team to make environment-related recommendations at different levels. These have been divided into two groups:

1. **Programme-related recommendations,** which aim to minimise the carbon emissions generated by education programmes like STELIR.
2. **Measurement-related recommendations**, which aim to improve the ways in which carbon emissions are measured and carbon footprints assessed.

In each case, recommendations are further organised by the stakeholder groups to which they apply.

Programmme-related recommendations

Programmme designers should:

1 **Re-use materials, particularly digital devices, wherever possible.** Purchasing new equipment, particularly digital hardware, dramatically increases carbon emissions through manufacturing. Where possible, designers should to try to find appropriate uses for devices beyond the lifetime of a single project. However, there are cases in which procuring new devices for a programme may be essential to guarantee programme quality and equity, especially in LMICs; participants' own devices or devices that have been left over from other programmes may not use operating systems that are compatible with project activities, and some participants using more up-to-date devices that others may result in inequitable delivery. To achieve a balance between these considerations, programme implementers should carefully assess participants' device access and provide new ones where necessary, rather than buying a new set for the entire cohort as a default option. Where buying new materials is essential, effort should be made to procure these as locally as possible to reduce transportation-related emissions (though it is important to recognise that even locally procured devices are likely to have global manufacturing supply chains).

2 **For face-to-face delivery, use locations that are easily accessible by public transport and require participants to make shorter journeys.** Transportation is a significant contributor to the carbon footprint of face-to-face teaching and learning. Utilising locations that require the minimum amount of travel for the majority of participants and staff will reduce its impact and improve participant wellbeing, and using locations that are easily accessible through public transport will reduce the emissions of personal vehicles, which are less environmentally friendly.

3 **Recruit local staff where possible to minimise the need for long-distance travel.** Hiring and training local staff will significantly reduce the volume of international travel required to implement a programme, rendering it more environmentally sustainable. Where international staff are required, consider the necessity to visit programme locations in-person and whether any activities that require their participation on-site could be replaced through remote methods.

4 **Integrate programme activities within existing tools and practices where sensible.** Reducing the number of additional activities and tools introduced by a programme will limit the carbon emissions it generates compared to the business-as-usual scenario. Designing programme activities around participants' regular schedule, such as delivering teacher training at their school, will help to reduce the number of carbon-generating activities that are added by a programme.

Programmme implementers and participants should:

1 **Treat all programme resources with care to reduce the likelihood of them having to be replaced.** The emissions associated with new equipment and digital devices are significant; using them carefully and returning them at the end of the programme will extend their lifespan and reduce the amount of new equipment needed.

2 **Take public transport to and from programme locations where possible.** In instances where transportation is a requirement of the programme, using public transport instead of personal vehicles will reduce the carbon footprint of each journey. Programme locations should allow as much as possible the use of public transportation to support implementers and participants in this endeavour.

Measurement-related recommendations

Education programme implementers should:

1 **Establish data collection processes to regularly obtain data relevant to emissions calculations, and integrate them within existing monitoring, evaluation and learning strategies.** Some data points relevant to calculating the carbon footprint of programmes are not routinely collected as part of regular programme monitoring, such as vehicle specifications used for programme transportation. Ensuring that these data points are integrated with existing data monitoring and collection processes will ensure carbon footprint assessments can be undertaken with little-to-no extra data collection needed and at any stage of implementation.

2 **Where possible, align data collection with available emission factors for commonly recurring emissions so that data can be easily transferred and utilised within carbon footprint assessments.** Data that is regularly collected as part of delivering teacher professional development programmes, such as information around transportation to and from locations, should be collected in line with the data requirement of their relative emission factor. In this case, data on the distance travelled in km alongside vehicle specifications should be collected. This means data collection can be streamlined with one data point being relevant for multiple purposes, such as outcome monitoring and carbon footprint assessments, instead of having to manipulate data for each purpose.

3 **Implement similar studies across a wider range of low- and middle-income contexts.** Undertaking carbon footprint assessments of other teacher professional development or education programmes in these contexts will help determine whether the findings and recommendations to emerge from this case study have wider applicability or are specific to this particular context.

Donors and programme funders should:

1 **Encourage this or similar environmental assessment activities.** As policies linking work to climate change become more widespread across the education sector, there may be increased pressure to engage with environmental impact assessments such as carbon footprint assessments.

Encouraging realistic, simple and relatively low intensity assessment approaches will offer significant insight in this area while ensuring that programme budgets and funding are not diverted away from delivering increased impact on learning outcomes.

2 **Prioritise supporting individuals and organisations to develop context-specific emission factors relevant to low- and middle-income countries.** While several databases for emission factors exist, these are primarily based in high-income contexts. Supporting, financially or otherwise, the development of emission factors in low- and middle-income contexts will help provide a strong base to improve the accuracy of carbon footprint assessments in these contexts. Long term, this will ensure that findings and recommendations resulting from such assessments can be asserted with much greater certainty.

For carbon accounting specialists and government agencies:

1 **Provide greater transparency around how current emission factors have been developed.** It is not always immediately clear what specific activities or processes are accounted for within publicly available emission factors, which undermines the certainty of any results. Greater transparency around the methodology to derive emission factors will ensure that their alignment and relevance to specific programme activities is clearer. This will help avoid any unintended duplication or omission of carbon-generating processes and activities within carbon footprint assessments.

2 **Ensure that all emission factors and associated data are open and free to access online.** Making this data as accessible as possible will enable environmental impact assessments and analyses to be more easily and widely integrated into education programming in low- and middle-income contexts by helping to overcome the lack of available contextual data which currently hinders their inclusion.

3 **Routinely include the manufacturing emissions associated with purchasing new hardware in carbon footprint assessments.** The STELIR case study demonstrates the significance of these emissions and how their inclusion is necessary to most accurately reflect environmental impact. While this is not common practice at the moment, it is important to ensure this significant impact is not being overlooked, especially in low- and middle-income contexts where technology for education is being procured at an increasing rate.

Links to tools and further reading

More detailed information about the study, the framework that was developed and the detailed findings can be found using the links below.

- Project overview and all detailed documentation, including activity mapping and carbon footprint calculations of the STELIR project https://www.jigsaweducation.org/stories/british-council
- Detailed recommendations for assessing the carbon footprint of teacher professional development programmes
- A framework for assessing the carbon footprint of teacher professional development programmes
- Carbon footprint assessment of STELIR: A case study report

As the climate crisis becomes increasingly severe, attention is turning to how education programming could become more environmentally sustainable. One aspect of education programming that is currently under-researched is the relative carbon footprint of face-to-face and online delivery models, a greater understanding of which could help organisations shift towards implementing increasingly sustainable projects.

This report outlines a study using an exploratory methodological approach for assessing the carbon footprint of teacher professional development programmes implemented in low and middle income countries, using a case study of the Secondary Teachers English Language Improvement Rwanda (STELIR) project.