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Completion Assessment Executive Summary

Educational Initiatives

June 2023

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Investee	Educational Initiatives
Main implementation country	India
Additional implementation countries	N/A
Funding amount agreed	$2.3 million (INR 190 million)
Funding amount disbursed	$2.3 million (INR 190 million)
Co-funding	None
Investment Date	24 August 2017
Actual implementation period	31 December 2022
Expected PYI range at year 10 (2021 estimate)	466K – 1,915K

Innovations

There is a widely acknowledged 'learning crisis' in low-income countries. Recent evidence suggests that over 60% of children aged 6-14 are not able to read at the second-grade level in India, despite primary school enrolment rates over 95% (ASER 2014). One reason for poor performance is the challenge of teaching extremely large, highly heterogeneous classes. Children have different levels of prior understanding, have varying degree of support at home, and absorb content at different speeds and styles. If, as is common, the teacher teaches to the level of the best-prepared students or at the grade level, others fall behind and may never catch up.

There are two major innovations in this project that aim to tackle this challenge. The first, a personalized adaptive learning, edtech solution called Ei Mindspark that aims to bring about personalized education to every child. And second, a Science of Learning Library (and its sub-project, the Science of Learning Library Institute) that aims to collate conceptual learning steps, common misconceptions, assessments tools and learning resources to inform state-wide administration, teachers, and policy makers.

Ei Mindspark is a computer-adaptive learning software developed by Educational Initiatives, to deliver personalized instruction to students in a regular classroom setting. Personalized Adaptive Learning (PAL) allows to bring Teaching at the Right Level[1] using technology. It does so by providing students with individualized instruction and providing teachers with a detailed reports on each student's understanding, misconceptions, and gaps. Ei Mindspark uses data to benchmark the learning level of every student and dynamically customize the material being delivered to match the level and rate of progress of each individual student. It identifies patterns of student errors and the underpinning misconceptions, and thereafter provides targeted content to resolve conceptual 'bottlenecks', which may be otherwise difficult to identify and address by teachers at an individual student level in a classroom setting. Notably, unlike other educational technology providers that rely on quick-fixes, content provision, and static learning solutions, Ei Mindspark marries a deep knowledge of the science of learning and a learning algorithm which has been developed through data collected from millions of students. Ei Mindspark allows to free up teachers' time to focus on other aspects of children's learning (e.g., wellbeing and social emotional learning) and generates a supporting classroom report, allowing and enabling teachers to focus on common misconceptions or learning gaps that the group faces.

'Science of Learning' is a common taxonomy of skills and misconceptions, benchmarking data on student performance on those skills, and a collection of remediation or learning techniques. The vision behind the

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[1] In this approach, developed and popularized by Pratham, teachers segregate students by achievement level and tailor instruction to each level. Ei Mindspark's innovation is to use computers, instead of teachers, to assess student level and provide appropriate content.

science of learning is that data collected through Ei Mindspark and in-person assessments can help identify the most common misconceptions students have in foundational learning and the remedial techniques which are most effective in correcting those misconceptions. The Science of Learning Library is a repository of these, and it aims to help inform high quality learning (learning with understanding and not simply based on marks or rote learning) for every child. The Science of Learning Library would be useful to teachers, teacher trainers and curricula developers. The Science of Learning Library Institute allows for the application and use of Science of Learning Library across one state. It aimed to build state capacity to a) use assessments to make student learning levels visible; b) identify common mistakes and misconceptions; and c) provide teachers with resources including explanation of common misconceptions, pedagogy discussion videos, remedial plans, and workshops to support their students. As a pilot the institution was set up at the government of Gujarat's Command and Control Centre.

Marketing of smallholders' produce has traditionally relied on a fragmented and multi-tiered ecosystem of intermediaries. This has resulted in low efficiencies, high levels of waste, and little value addition between farmgate and market. In addition, buyers seeking uniform high-quality produce are unable to satisfy their demand, and private infrastructure investment is inadequate.

Goal of investment

The grant for Ei Mindspark was primarily driven by the vision to explore and support the roll out of personalized adaptive learning solutions in government schools in low-income contexts. While there is strong evidence around teaching at the right level, personalized adaptive learning offered the unique promise of rolling out a low-cost, scalable model that was not dependent on teachers' capacities. The intervention promised high social returns on investments with high impact levels (both in terms of depth and breadth). However, Global Innovation Fund (GIF) also hoped to inform the larger edtech and personalized adaptive learning space (including other personalized adaptive learning providers, think tanks, and policy makers) by demonstrating the potential of PAL in public schools, but also generating learning on how it can best be implemented in this context.

The grant for the Science of Learning Library innovation was primarily driven by the vision to develop an understanding of the science of learning foundational concepts. Such a public encyclopaedia has the potential to support curriculum developers, teachers, personalized adaptive learning solutions, and policy makers. The library would help inform and improve pedagogical approach and personalised learning trajectory algorithms. More importantly it would serve as a valuable resource for other edtech providers by helping them improve their products and lowering entry barriers.

Objectives, implementation performance and outcomes

Over time, there were two major changes in the grant. First, the original intention was to develop a learning lab wherein randomized quasi-experiment based RCT would be conducted on what Ei Mindspark content children faced leading to identification of what works. However, this would have required two to three hours/day/student vs the one hour that was achieved in practice. Second, there were two models of Ei Mindspark implementation planned – a heavy touch and a light touch model – and the light touch was replaced by a Science of Learning Library Institute. The difference between the two models is the intensity of Ei Mindspark support. The heavy touch involved assigning a dedicated computer assistant to each school who would run the Ei Mindspark labs on a regular basis. The light touch involved the allocation of one coordinator across several schools with existent schoolteachers running the Ei Mindspark labs. The light touch model, in a joint decision with GIF, was scrapped due to the anticipated roll-out of a light-touch Ei Mindspark model across 2600+ schools in Andhra Pradesh. however, this never panned out. Instead, to meet the goals of the light touch model, Educational Initiatives implemented a staggered reduction in support within the heavy touch model where over the three years of implementation the ratio of computer assistants to schools was reduced from 1:1 to 1:3 or 1:4.

Most of the investment was utilised to support Ei Mindspark employment in government schools (59%), while the remainder supported Science of Learning Library (41%). The original funds allocated were intended to be split 70% and 30%.

Broadly speaking the grant objectives and KPIs have been partially met. While Ei Mindspark was successfully rolled out and implemented, dissemination of the public goods has been limited. And similarly, for Science of Learning Library while learning materials and portals were created, their reach and usage remain limited. The following table summarizes the objectives and the outcomes.

Objectives	Implementation performance and outcomes
1. Deploy the Ei Mindspark Programme in at least 40 participating government schools and benefit at least 5,000 children in those schools, with the aim of improving learning outcomes in mathematics and Hindi. This will provide a use-case example for the use of technology-based interventions in government schools to improve foundational literacy and numeracy skills among children.	Ei Mindspark deployment was successfully met. The intervention was successfully deployed across 40 government schools in Rajasthan and observed regular usage (by 6,000+ students for 54+ minutes for each of the two subjects) and improved student outcomes (preliminary RCT findings from a study by JPAL suggests an effect size of $0.21 – 0.23$ SD) over the course of the three years. The impact achieved was notably consistent across age (except grades 1 and 2), gender, socioeconomic status, and students with differing prior learning levels suggesting that the intervention held its personalized nature of education when implemented at scale. The implementation was supported with school leader and teacher trainings, regular reporting to the district and state government officials, a support helpline for teachers, dashboard for teachers, and a series of micro-innovations (to counter operational problems including low computer to student ratio, time-based logistics, teacher buy in, curricular alignment, and limited teacher digital literacy).
2. Create a process discovery output that documents learning about the processes underlying the scaling up of Ei Mindspark. The grant supported the documentation of tools, process maps and similar methods using information collected from the deployment of Ei Mindspark Programme in order to assist in the scaled adoption of Ei Mindspark Programme and any other education technology solutions in non-participating government schools in Rajasthan and elsewhere in India.	Detailed Ei Mindspark process discovery outputs were created, but the goals of informing the wider educational community are still in progress. The grant helped support the development of several public goods documenting processes (including a process handbook to scale edtech interventions and a DIY toolkit for edtech providers) to implement edtech solutions at scale. Ei is in the process of creating "The PAL Portfolio," an online resource-sharing platform and evidence library to assist in implementing PAL in low-resource school settings around the world. The launch is planned for October 2023.
3. Promote and lead to the public scale up and procurement of the intervention or any other Adaptive Learning Solutions in Rajasthan and, to the extent possible, other states in India. Additionally, inform reforms in existing information communication and technology policies to support the scaling up of adaptive learning solutions and establish processes of public procurement for the deployment of the Ei Mindspark Programme or other similar computer-aided adaptive learning solutions in public schools.	Adaptive Learning Solutions Scale up objectives were partly met. In addition, to the existent intervention the Rajasthan government ordered the procurement of 20 computers each in 5,000 schools (however, unfortunately, the vendor provided substandard hardware that did not match the given requirements). Notably Educational Initiatives have been extremely effective in informing policy and motivating multiple other state governments to procure hardware, invite proposals, and sign MoUs with state government (Andhra Pradesh in 2019 and Madhya Pradesh in 2021, now discontinued; Haryana and Chhattisgarh upcoming; and Uttar Pradesh with Niti Aayog) for personalized adaptive learning solutions.
4. Develop a repository of key pedagogical concepts in Math and Hindi for grades 1-4 (Science of Learning Library) with the overarching aim of understanding how students learn, which include: a) list of key pedagogical concepts in Math and Hindi for grades 1-4; b) misconceptions and common errors	The Science of Learning Library saw mixed results. While most of the necessary work in curation, creation and preparation of the resources has been completed, the various public goods have not reached the desired level of progress and usage (the online repository is still incomplete, and the research papers have received extensive number of rejections). Educational Initiatives are actively working on and plan to update/complete the online repository in due

under the concepts; c) ways to assess proficiency on the concepts; and d) ways to remediate the most common misconceptions and errors.	course of time (also drawing upon their other projects including a large-scale assessment across a state as a part of a separate venture). Additionally, some of the materials have also been donated to the Diksha portal (government-maintained portal for teachers).
5. Create a Science of Learning Institute, in partnership with Government of Gujarat (within its Command-and-Control Centre) that develops actionable insights based on assessments and data collected by the government. Additionally, it aimed to provide teachers with pedagogical insights, assessment and remedial resources, develop a context specific Science of Learning, and make students' learning levels visible and transparent.	The Science of Learning Institute was largely unsuccessful due to circumstances beyond Ei's control. It was established during the Covid-19 pandemic and faced significant challenges. The government did not meet their commitment to hire supporting team members (only one person was allocated to the institute instead of the sixteen people initially). Additionally, granular large-scale assessment data was not available. Ei pursued impact through alternative channels, including integration of AQAD (ASSET Question A Day) into various state-level educational technology platforms for teachers; development of platforms to help make students learning level visible and to share remedial materials; conducting workshops to build teacher capacity throughout the state; and developing a portal to track student achievement using data from the Semester Assessment Test (SAT).

Ei Mindspark reach and 10-year (ex-post) impact

Over time Educational Initiatives have managed to scale their operations. As of 2022, they are currently working with 5000+ schools across 17 states and more than 600,000 students. Some of the noteworthy partnerships in 2022 include P&G India's CSR initiative (60,000+ students), Amazon Future Engineer Program (50+ tribal schools serving 10,000+ students), Naandi Foundation (180,000+ students), Quality Education India Development Impact Bond (14,000+ students), Bharat EdTech Initiative (57,000+students), and Magic Bus India Foundation (10,000+ students). Additionally, recently, they have received the USAID DIV funding to roll out the intervention to 120 schools across 3 states in India. They signed MoUs with Madhya Pradesh, Andhra Pradesh, and Chhattisgarh (still pending approval) to roll out Ei Mindspark in 2,100, 2,600 and 4,000 school, respectively. However, the MoUs with Andhra Pradesh and Madhya Pradesh have since been scrapped or discontinued. They were able to convince the Rajasthan government to procure 100,000 (20 each in 5000 schools) computers (though the state, unfortunately, procured hardware that did not match the necessary specifications). They have renewed permissions to continue operating in the 4 districts of Rajasthan, that they originally worked with through GIF's support, and Ei Mindspark will be made available in these schools with financial support from other funders.

Table 1: total number of government schools and under-resourced students reached by Ei Mindspark across India (including those reached through funding from other sources).

Year	Number of Schools	Number of Students
2017	70	12,346
2018	199	21963
2019	326	69,887
2020	Not applicable – all schools around the country remained closed due to the pandemic and Ei Mindspark was administered remotely.	69,887
2021	Not applicable – all schools around the country remained closed due to the pandemic and Ei Mindspark was administered remotely.	364,291
2022	500+	600,000+

We currently expect an ex-post PYI of 784 K to 3.2 M. This is lower than the ex-ante estimates for the following reasons:

- EI's growth and expansion has been slower than initially projected.
- Various MoUs did not pan out as intended (and have been scrapped or discontinued)
- The complexity of government partnerships (and in going from MoUs to implementation).
- The depth of impact was much lower than that of the Delhi pilot (due to shift in operational models). Additionally, there were relatively even smaller improvements in year 3 implementation (either due to test score decays or reduced presence computer assistants).
- Covid disruption has set the operations back significantly.

It is important to note while the depth is much lower than that of the Delhi pilot, however, the level of impact is comparable to some of the most effective educational interventions across the world like Teacher at the Right Level, performance-based pay, and video-cameras at schools (leading to improvements of 0.14 – 0.28 SD). However, given that Ei Mindspark has achieved similar levels of impact at a much larger scale, it makes the program even more valuable and scalable. Dr Abhijeet Singh in an interview for the assessment exercise, suggested that the intervention is in the 90th percentile of educational interventions that he has seen around the world. Additionally, the grant also helped develop deeper process understanding of how to work with government schools and scale, which will help improve efficacy over time.

Other impact
GIF (and another funder, P&G) supported Educational Initiatives at a crucial time when it was unlikely Ei Mindspark would have continued their experiments in public education space without external support. Since then, Educational Initiatives has been able to attract support from other funders and organizations that has allowed it to reach over 600,000 children in the last academic year. Additionally, it is important to note that at the time of the grant the country's ICT policy and interventions only focused on installing computers at schools and were at best used to increase computer literacy. Over the course of the grant (through the grant and other developments) there is a noted growth in interest to leverage technology to promote learning. Furthermore, it has led to the development of a larger ecosystem of edtech providers who are now developing solutions for public sector, at the time of the grant, the few edtech providers restricted their services to expensive private schools.

Over the course of the grant there has been a reduction in cost per child per year from $ 150 (before the start of the study), to $ 60 (funded by GIF) and to $20 – 25 (by the end of the grant period). These costs exclude hardware and infrastructure costs. The grant also facilitated a pricing cap, when selling to government schools, on software subscription costs for a period of 8 years. The tiered maximum pricing caps are as follows: $ 16 per student per year when reaching 10,000–- 50,000 students; $ 8 per student per year when reaching 50,001–- 100,000 students; $ 4 per student per year when reaching 100,001–- 200,000

students, and $ 2 when reaching over 200,000 students. Note: the price caps are much below the typical costs that Educational Initiatives charged other affordable private schools or corporate funders (under corporate social responsibility) that had previously funded implementation in public schools. This tiered pricing strategy is applicable on individual orders per state (rather than cumulative numbers of government school going students that Educational Initiatives works with). They have stuck to this commitment for the various large-scale tenders.

A major contribution of the grant, resulting from GIF's engagement with other stakeholders including Central Square Foundation (CSF), Dalberg, and government of India's department of School Education included the development of procurement guidelines for PAL services by public schools. CSF and Educational Initiatives have shared this document with state governments interested in personalized adaptive learning to help aid and speed up the procurement process. The work done through the grant while beneficial to the children that were directly impacted, Educational Initiatives and its further expansion, however, there is further potential for impact if the various public goods created because of the study are made public.

Learnings

The project serves as one of the highest Practical Impact-rated projects for GIF. It serves as means of de-risking pathways to scale. The grant serves as a proof of concept that personalized adaptive learning solutions can not only be effectively adapted and rolled out to public schools and lead to academic learning gains but also hold its ability for personalized learning (this draws on preliminary findings of an RCT study by JPAL). A previous RCT carried out prior to GIFs investment was at a small scale, using after school hours, within centres outside schools, using additional contact hours, and with middle school going children. Apart from this there are several key learnings for the grantee, the larger personalized adaptive space and GIF.

Learnings for Educational Initiatives

- The process discovery led to identifying and noting key processes supporting successful roll out of personalized adaptive learning solutions including setting up the computer lab, timetabling the sessions, routines for pairing students, the role of computer assistants, resolving arising issues through supporting call centres and IT partnerships, school integration strategies, aligning learning materials with the curriculum, managing government partnerships, building teacher and student buy-in, and alignment with curricula.
- The grant also brought about the development of several micro-innovations (to counter operational problems including low computer to student ratio, time-based logistics, teacher buy in, curricular alignment, and limited teacher digital literacy).
- The implementation highlighted the need for deep process evaluation and the development of a light touch model for universal/state-wide coverage.

Learnings for the personalized adaptive learning ecosystem

- The grant has buttressed the recognition of the role and effectiveness of personalized adaptive learning and more importantly led to policy level reforms.
- The grant through its public goods (process discovery and procurement guidelines) has the potential of informing other edtech providers to transition to scale and for governments to make informed decisions. The public goods are highly generalizable and outline key steps and processes for effective implementation.

Learnings for GIF

- Providing a grant to a private company led to extended discussions and learning on how to collaborate with private companies, various compliance strategies (e.g., tiered pricing), and the importance of public good and guidelines/strategies to ensure that these resources are actively disseminated.

- While co-financing is extremely important, there is a fine balance that needs to be struck between the dependence on the co-funding and collaborators. One of the learnings from the grant is to pre-plan necessary contingencies should co-funders and collaborators struggle to deliver. For example, governments may sign MoUs but that cannot be seen as a guarantee and similarly research organizations might commit to timely outputs, but research timelines can change drastically.

Key challenges to scale personalized adaptive learning solutions

Personalized adaptive learning has been extremely effective, though the grant, along with several other reports, have highlighted several barriers exist that prevent its large scale roll out.

- Limited presence of necessary hardware and limited budgets for software.
- Absence of public procurement guidelines and support for software procurement.
- Limited comparative evidence on the effectiveness of different tech-based learning solutions (static and personalized adaptive learning).
- A limited process understanding at the systems level.
- A limited process understanding of enablers and constraints in the systems that drive stakeholder motivation and buy in, school wide adoption, and student usage.
- The need for developing additional content to cover all subjects and age groups.
- Currently, the intervention works in a schools of a given size and with a certain set of resource, however many schools across the country will not meet this.
- The need of computer assistants continues to limit scalability and alternative school-wide processes need to be developed/leveraged to ensure scalability.
- Absence of proof of concept and process understanding for universal / state-wide coverage.
- There is a strong need for multi-intervention studies exploring the role of nonadaptive and adaptive edtech solutions for different kinds of schools, age groups, and other factors.

Acknowledgements