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Author(s): Leena Zahir and Janhvi Maheshwari-Kanoria

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PROJECT-BASED LEARNING AS AN INNOVATIVE COVID-19 RESPONSE

LEENA ZAHIR AND JANHVI MAHESHWARI-KANORIA

ABSTRACT

The impact the COVID-19 pandemic has had on learning has been acutely felt in underserved and low-income contexts, remote and rural settings, and education in emergencies settings, where most students lag behind age-appropriate milestones in learning and achievement (World Bank 2019). Digital remote learning methods were pervasive in the global education response to the pandemic, which left marginalized learners, most of whom were not digitally connected, at a disadvantage and exposed them to greater learning loss and higher dropout rates than their peers with digital access (Dorn et al. 2020). In this field note, we recommend project-based learning, a unique pedagogical approach that promotes relevant, holistic, student-centered learning and 21st-century academic skills. The innovation has had promising preliminary results among the digitally marginalized during COVID-19-related school closures. Some students participating in the proof-of-concept pilots experienced up to 28 percent growth in academic and nonacademic skills and reported satisfaction with the project-based learning resources of up to 98 percent, as well as a positive shift in their mindset toward learning. The initial success of the early-stage pilots in diverse geographic and education contexts indicates that the model has the potential to scale.

INTRODUCTION: GAPS IN GLOBAL EDUCATION RESPONSES TO COVID-19

COVID-19-related school closures in early 2020 disrupted the education of over 91 percent of the world's school-age children (Nugroho et al. 2020). More than 90 percent of countries responded to the pandemic by developing digital and broadcast programs that were accessible to almost 70 percent of students. However, this tech-heavy response had marginalizing implications, as it left more than 30 percent of the world's students without access to education; more than 70 percent

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of the students who could not be reached live in remote and rural areas where access to technology, even television and radio broadcasts, is often limited (UNICEF 2020). Moreover, while the broadcast media can deliver content to learners, they cannot support student engagement or provide feedback, which limits their ability to promote students' acquisition of knowledge and foundational skills. These limitations provided the rationale for Education Above All (EAA) to develop an innovative and flexible project-based learning (PBL) solution that enables underserved learners to continue learning without requiring access to the internet or other technology, or to other limited resources such as educational materials and extensive parental support.

REVIEW OF THE LITERATURE

PBL is a pedagogy that promotes student autonomy and the construction of knowledge through active, experiential learning and investigation (Billah, Khasanah, and Widoretno 2019; Mohammed 2021; Thomas 2000). Seven essential design elements characterize effective PBL: (1) a challenging driving problem or question; (2) sustained and iterative inquiry throughout the duration of the project; (3) authenticity and real-world relevance; (4) student voice and choice; (5) opportunities for student reflection; (6) opportunities for student-led critique and revision; and (7) the culmination of the project via a tangible or intangible public product (Larmer 2020). Meta-analyses of PBL research over the last 20 years have found that it was associated with more learning gains in several subjects than learning gains achieved through [conventional direct instruction (Chen and Yang 2019; Thomas 2000). PBL also was found to be effective in programs conducted with learners of low socioeconomic status (Anderson and Pesikan 2016; Mohammed 2021). Although most evidence on PBL's effectiveness comes from K-12 settings, a recent study found that PBL also improved leadership skills among third-grade Palestinian refugee students (Migdad, Joma, and Arvisais 2021). However, there is a dearth of literature on PBL in crisis-affected contexts. Our aim in this paper is to contribute to this evidence base and to argue that PBL is a viable teaching and learning method in such contexts.

PROGRAM FEATURES AND MODALITIES OF USE

INNOVATIVE DESIGN FEATURES

EAA developed the Internet-Free Education Resource Bank (IFERB) to address some of the challenges in creating crisis-sensitive learning opportunities. In this paper, IFERB refers to the bank's interdisciplinary PBL resources, which are a

collection of educational projects that promote academic, 21st-century, and life skills, including financial literacy, entrepreneurship, and social and emotional learning. These resources, which cover mathematics, science, social studies, and environmental studies, are available for preprimary, primary, and lower secondary learners. The IFERB resources require only the use of low-cost, commonly available materials, and no technology or internet is needed once a PBL project is accessed through the EAA website. They also can be used effectively in low-literacy contexts, as they require limited parental guidance and promote student agency.

While the IFERB resources offer most of the critical features of effective PBL, they can be considered innovative from a pedagogical perspective for several reasons. First, unlike typical teacher-facing PBL resources (Norfar n.d.), IFERB resources contain detailed but simplified instructions that are shared directly with children or their caregivers; the teacher facilitates the lessons. This was especially valuable during COVID-19-related school closures, when the resources were used for self-directed learning, with some caregiver support. Where learners gathered in person, the approach enabled volunteers, who sometimes had no teaching experience, to facilitate lessons successfully without being subject-matter experts. Concise instructions were essential to enabling the novice teachers, untrained facilitators, and low-literacy caregivers to facilitate lessons.

Second, unlike typical PBL resources, IFERB attempts to provide core instruction resources while simultaneously providing learners with an opportunity to apply their learning and take ownership of each IFERB project by creating shareable products. This approach means that the projects serve as mini-lessons on specific topics instead of summative, end-of-unit exercises. For example, learners in one project were asked to design an animal park (Education Above All 2020). They were not expected to have prior knowledge about animal habitats and adaptations because the activities and descriptions in the projects served as a mini-lesson on these topics. The various IFERB projects were designed with low-resource contexts in mind, and they aimed to present topics in a manner that was contextually feasible, even before the implementing organizations specifically contextualized the projects, which teachers and volunteers later implemented with learners.

Third, unlike typical PBL projects that require computer or internet access for learner-led research (Bell 2010), IFERB introduced PBL in low-resource contexts that had teacher shortages without requiring a sizable investment. Learners carried out their independent study through technology-free investigation, exploration of their environments, and interviews with their community members. Therefore, IFERB can be considered an innovation in pedagogy that combines PBL with a

mini-lesson format and provides simplified student-facing instruction, and that can be implemented with minimal resources.

DIVERSE MODELS OF OPERATION

IFERB was initially created to serve as a stopgap solution to ensure learning continuity during the pandemic, especially for learners unable to benefit from existing distance learning programs. Target beneficiaries included low-income students, out-of-school children and youth, and children in refugee settlements, remote rural communities, and underserved urban contexts. It was piloted by 21 organizations working with vulnerable learners in Kenya, Lebanon, India, Zambia, and Pakistan and reached more than 106,000 learners using two main models.

Remote: The teachers or facilitators used mobile phones to share instructions for the project tasks. They used phone calls and SMS to reach students in households with feature phones (non-smartphones with limited functionality), and applications like WhatsApp to reach those with smartphones and some internet access. Learners without access to mobile phones received printed materials with simple instructions or verbal instructions during facilitator home visits.

In person: Learners gathered in small groups in community learning spaces to receive IFERB project instructions from the facilitators. Where schools were partially open, the teachers also used IFERB as part of a lesson.

Supported by EAA, the implementing partners selected an average of 12 IFERB projects that were relevant for their learners and adapted them to fit their contexts. Some organizations also translated selected resources into local languages before implementation. Table 1 summarizes the details of each pilot. The IFERB resources complemented the main curriculum in most of the pilots, and the delivery methods alternated between remote and in-person implementation, depending on the COVID-19 restrictions.

Table 1: Overview of Pilot Organizations

Organization	Location	Number of Learners	Number of Educators	Context
Mantra4Change	India	100,000+ (through 15 organizations) Age: 5-15	950	Rural and tribal out-of-school and enrolled learners; remote and face-to-face implementation
EkTara	India	600 Age: 4-14	40	Semi-urban low-income enrolled learners; remote implementation
Barefoot	India	250 Age: 4-7	11	Low-income enrolled learners; remote implementation
British Council	Pakistan	1,000 Age: 8-11	100	Semi-urban and rural enrolled learners; remote implementation
Zambia Open Community Schools (ZOCS)	Zambia	2,150 Age: 8-14	-	Rural enrolled and out-of-school learners; face-to-face implementation using radio
Lebanese Alternative Learning (LAL)	Lebanon	1,000 Age: 4-8	142	Semi-urban and rural Lebanese enrolled students and Syrian refugee learners; remote implementation
Dignitas	Kenya	1,200 Age: 4-11	61	Low-income semi-urban learners; remote implementation

The IFERB training program for implementers covered an overview of PBL and IFERB, resource selection and contextualization, implementation, and learning assessments. The implementers were responsible for the selection and contextualization of the resources. A cascading approach was adopted for this training, whereby designated staff members were trained by EAA and they in turn trained their colleagues. A total of 1,293 educators were trained, including teachers and volunteers with little to no teaching experience.

The EAA staff created the IFERB resources with input from the implementing partners to ensure their relevance. The implementers played an active role in contextualizing the selected projects and suggesting themes for new projects. Some early implementers also created monitoring and evaluation tools used in later pilots, including surveys and assessments. The implementing organizations

did not collaborate bilaterally, but frequent monitoring by EAA facilitated iterative cross-pilot learning and modification. Third-party specialists were hired to review and improve the beta-stage resources and accompanying tools.

MEASURING EFFECTIVENESS

MONITORING, EVALUATION, AND LEARNING

A monitoring, evaluation, and learning (MEL) framework was developed to measure IFERB's effectiveness in (1) providing a learning solution; (2) providing access to learning opportunities; (3) promoting different types of learning outcomes; (4) promoting social and emotional skill development; and (5) providing relevant learning opportunities in diverse crisis-affected contexts.¹

A mixed methods approach was used for data collection. Surveys were administered weekly to literate students or caregivers to collect feedback on their experience, their satisfaction with the learning, and the ease of doing the projects. Focus group discussions were conducted with teachers or volunteer facilitators toward the end of the pilot. The academic assessment was a question bank of three types of questions: knowledge, skills, and discovery.² The 21st-century skills assessment contained a prompt and accompanying rubric for assessing students in three skills: communication, critical thinking, and creativity.

LIMITATIONS

Although standardized tests have been used to measure the effectiveness of PBL (Kokotsaki, Menzies, and Wiggins 2016), it was not possible to use them to measure learning growth through use of IFERB because EAA did not have control over the projects the organizations selected. Assessment questions were instead created for each project to enable users to curate their own assessments. This ensured a degree of flexibility that is central to IFERB but did not allow for a standardized method of assessing growth across pilots.

1 Learning outcomes included general knowledge, numeracy skills, literacy skills, 21st-century skills, etc.

2 Knowledge questions tested learners' understanding of information/general knowledge related to the project, skill questions their ability to apply some of the ideas covered in the project, and discovery questions their understanding of the main concepts or ideas of the project. The question bank can be accessed at <https://drive.google.com/file/d/1TZ5A1ZLzdjGx0eJOA9rSir0U31ssotlC/view?usp=sharing>.

Learning assessments were administered as both baseline and endline tools. While the assessment methods were not designed to be rigorous enough to attribute learning to IFERB, the attributability of the findings was strengthened through triangulation with the survey and focus group discussion data.

The implementers also faced several challenges due to COVID-19 restrictions, and in planning and implementing the pilots and MEL tools. First, the MEL tools were administered inconsistently, which resulted in missing data points for some organizations. Second, learning and growth measures could have been underestimated since the resources selected in some cases were not appropriate for students' learning levels, due to the inaccurate assessment of their baseline levels and abilities. Third, some pilots conducted assessments remotely, which proved challenging, given the scarcity of mobile phones and the low literacy rates among some caregivers. While IFERB did not rely on technology for implementation, mobile phones were needed for reliable remote data collection. When printed projects were shared directly with the students, for example, the organizations could not verify that they completed the activities themselves, rather than a sibling or parent, without contacting them.

Limitations related to program implementation included the significantly greater effort required to translate and contextualize resources than that required for conventional curriculum lessons, as well as the lack of school textbooks and learning materials available to learners. Using the projects independently of other curriculum resources made parents skeptical about their usefulness.

RESULTS

PROVIDING ACCESS TO LEARNING

Three measures were used to evaluate access: (1) the participation rate of all targeted students; (2) the completion rate of all participating students; and (3) the percentage of unreached students among all participating students. Although the reopening of schools in one context (Dignitas, Kenya) resulted in a lower participation rate (65%), IFERB projects had an average completion rate of 86.7 percent. Another access measure is the self-reported accessibility of the required supplies: more than 84 percent of the students and caregivers reported that they could easily find the materials needed for their project activities.

PROVIDING AN EFFECTIVE LEARNING SOLUTION AND PROMOTING DIVERSE TYPES OF LEARNING

The primary measure of IFERB’s success as a learning solution is its ability to contribute to growth in academic learning and 21st-century skills. The 21st-century skills assessment was a more standard measure than the academic assessment. Teachers used a standard rubric to evaluate students’ communication, critical thinking, and creativity skills, based on their responses to various prompts.

Table 2 summarizes the results of the academic assessments. While these results indicate that the average learning outcome growth in the knowledge, skills, and discovery domains was 19.2 percent, younger learners appear to have been more affected. For example, the age-disaggregated data for Mantra4Change (2021) reveal that 5-year-old students’ growth was 25 percentage points, which compares to average growth of 16.55 percentage points from baseline to endline. This finding could result from the partners’ limited exposure to PBL methods and misinformation about students’ initial learning levels, which could have led the beta stage pilots to choose more accessible resources or to oversimplify them, making them inadequately challenging for learners.

Table 2: Learning Assessment Results

Organization	Average Baseline Score (out of 100)	Average Endline Score (out of 100)	Average Percentage Growth
Mantra4Change	59	75	28
Dignitas (Level 1)	67	79	18
Dignitas (Level 2)	80	89	11
British Council	77	93	22
LAL	67	79	17
Average			19.2

The results of the 21st-century skills assessment summarized in Table 3 indicate that learning outcomes grew for each skill, with more students placed in advanced levels at endline than at baseline. Several other measures provide evidence of improved learning. More than 92 percent of the students and caregivers surveyed reported being satisfied with the learning students acquired. Additionally, more than 82 percent of the implementers agreed that IFERB resulted in more learning than previous methods used, 92 percent agreed that students learned and grew

academically, and 80 percent agreed that students developed 21st-century skills through the projects.

Table 3: 21st-Century Skills Assessment Results

Organization	Communication		Critical Thinking		Creativity	
	Baseline	Endline	Baseline	Endline	Baseline	Endline
Dignitas (Level 1)	36	61	34	61	41	56.5
Dignitas (Level 2)	75	85	65	80	65	84
LAL	28.5	42	46	82	76	91
Mantra4Change ³	3.4	3.8	3.5	3.8	3.5	3.9

PROMOTING POSITIVE ATTITUDES AND MINDSETS

The participating organizations also reported a shift in students' values and attitudes toward learning, as noted by the British Council (2021, 20):

The...pilot has provided our students with a creative environment, which encourages them to think outside the box. Projects such as "Adventures in the plant kingdom" have motivated our students to start plantation drives and raise awareness regarding the importance of trees within their communities...

We observed a significant improvement in the level of motivation of students in completing their regular school tasks. Not just that, parents have definitely stepped up after the pilot and increased their interest in the education and progress of their children. Most of them have become active and even offered to help in providing the children with an improved learning environment both at home and school. I have seen this interest from parents for the first time and it is truly remarkable.

Teachers from this pilot also shared anecdotes about the program's impact on students' and caregivers' mindsets. One mother who facilitated her daughter's lessons through IFERB discovered her daughter's talent and passion for learning.

³ Whereas the percentage of students placed in levels 3 and 4 for each skill is presented for most of the organizations, the data presented for Mantra4Change communicate the average level in which students were placed at baseline and endline.

Her participation prompted her to take a stand against child marriage, which is prevalent in her region, and to allow her daughter to continue her education.

Other reported shifts in mindset include improved attitudes toward gender roles. Teachers in the Zambia pilot also credited the program with improving student retention. They explained that students who had dropped out started returning to school after hearing about the participating students' work. They also said that the projects improved students' interest in learning, particularly those who were in school but had previously disengaged.

EFFECTIVENESS AS A CRISIS RESPONSE

According to feedback from the implementing organizations, 96 percent reported satisfaction with the overall pilot experience, and 80 percent reported satisfaction with the supporting tools provided, including MEL and training materials. Additionally, 80 percent said that IFERB met students' learning and context-specific needs, 92 percent expressed their desire to continue using IFERB, and 96 percent expressed interest in scaling the program with other organizations in their countries. To ensure sustainability, EAA provides training on developing PBL resources to enable partners and educators to continue using PBL, even after exhausting the available IFERB projects.

KEY LESSONS

EMPOWERING EDUCATORS AND IMPLEMENTERS TO ADOPT PBL

Although all stakeholders were trained to adapt and implement the projects, most felt underprepared to align the content with the curriculum, train educators, reach students, and engage parents. Regular communication with EAA helped the implementers address these challenges promptly. Building the implementers' confidence and capacity to contextualize and align the resources with the formal curriculum helped ensure that projects were not disconnected from students' contexts, curricula, or learning goals, and that they were not burdensome for educators.

Many implementers assigned mentors to guide the educators; one assigned six coaches to support sixty-one participating teachers, and another had eight supervisors overseeing the progress of forty teachers. Creating communities of practice among the educators facilitated the sharing of ideas, highlights,

and challenges faced, and encouraged educators to learn from each other. The facilitators at one organization regularly held learning circles to help educators reflect on the school week and plan for the next. Others organized a weekly discussion spearheaded by a different teacher each week, which enabled them to distribute leadership throughout the pilot. This improved teachers' ownership of the program and accelerated uptake among the cohort.

BUILDING EFFECTIVE PARTNERSHIPS WITH CAREGIVERS AND LOCAL COMMUNITIES

Engaging parents effectively was a key challenge. It was particularly impactful because remote implementation required access to mobile phones, which were typically owned by the parents or caregivers. Most of the projects also required input from family members, such as presenting projects, surveying parents, etc.

Many parents initially hesitated to participate because they did not recognize the value of PBL and requested that textbooks and worksheets be used instead. The implementers used several measures to improve engagement, including orienting caregivers to the significance of PBL and the powerful impact of hands-on learning and the inquiry-based approach. As they observed students' growth and engagement over the course of the pilots, most caregivers came to support this approach. In three pilots, this change in attitude helped lower the student dropout rate. While the activities present opportunities for caregiver participation, it is essential that their literacy levels and availability are considered. Caregivers can be supported by using appropriate communication methods, such as audio instructions in low-literacy contexts, and by limiting the number of tasks requiring their input, especially in remote contexts where the device owner is unavailable during the day.

SUPPORTING STUDENTS

Another challenge implementers faced was the ability to accurately determine students' skills at baseline. In the revised training for the second cycle of IFERB pilots, organizations were asked to rely on students' records or to conduct a pre-baseline assessment with a sample of students.

Inexperienced educators found it challenging to scaffold student learning, balance didactic and autonomous learning, and help students build skills in reflection and revision. Creating communities of practice and holding professional development sessions on relevant topics can help educators feel more supported, reinforce

skills gained through the initial training, and introduce new skills needed for ongoing implementation.

Since the conclusion of the initial pilots discussed in this paper, EAA has supported five new IFERB pilots that respond to educational needs and improve the quality of education in contexts of protracted crises, such as in Yemen and Sudan, and in low-resource contexts such as in Morocco and Kenya. IFERB was also adapted and used in the acute crisis responses for Afghan and Ukrainian learners. As part of its sustainability strategy and to support future implementers, EAA will create a platform to share lessons from previous pilots and implementation guides.

CONCLUSION

Responses to mitigate the effects of COVID-19-related school closures have highlighted the magnitude of the global digital divide; most digital solutions to providing ongoing education were inaccessible, ineffective, or unengaging for marginalized learners. IFERB is an innovation designed to solve the issue of access to high-quality learning for these learners and to promote student engagement and growth in various academic and nonacademic skills. It is considered innovative in that it offers PBL in a student-centered, experiential learning format that reduces the need for prior knowledge of the topic and requires minimal resources to implement. It was piloted in five countries, with promising preliminary results, including an average growth rate in academic skills of 19.2 percent and several shifts reported in the mindset and attitudes of students, caregivers, and teachers.

Feedback from the implementing partners confirms that IFERB not only provided students with access to learning in the absence of alternatives but also enhanced their learning experiences and built educators' and implementers' capacity to implement PBL. The success of the pilots in five unique contexts indicates the replicability of this approach and its potential for scale, especially given that more than 90 percent of the implementers want to sustain and scale it in their own contexts.

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