

Strengthening Early Childhood Education Using Smartphones in India

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Abstract

Early Childhood Education encompasses an interlinked gamut of elements critical for a child's cognitive social and emotional development. The first six years of development in a child's life are critical to their overall development and well-being. According to UNICEF, 'Investing in Early Childhood Development is one of the most cost-efficient and powerful strategies to achieve fair and sustainable development. India's development trajectory is critically linked to investments in healthcare and education. Achieving the Sustainable Development Goals (SDGs) is firmly anchored on investing in human capital and inclusive growth.

Anganwadi Centers, part of the Integrated Child Development Services program, provides essential early childhood services offered by the ICDS across the lengths and breadth of the country. They cater to India's challenge of providing nutrition and healthcare options to children and mothers through counseling, pre-school education, immunization, and the supply of medical, health, and nutritional resources. The environment, inputs, and support that children receive in their first eight years will have an enormous impact on the rest of their lives – not only in terms of their performance in school but on a wide range of other outcomes that extend far beyond school. In recent years India has made significant progress in strengthening the policy framework for early childhood.

The Government of India released the National Early Childhood Care and Education (ECCE) Policy in 2013, and subsequently a National Curriculum Framework and Quality Standards. Together, these documents provide a comprehensive framework for promoting access, equity, and quality in ECCE. State governments have designed their curricula in the light of this national framework. For the pre-primary education sector, smartphones are envisioned to help in delivering a meaningful early childhood education, with autonomy to reflect the local context and the setting. ICT-driven innovative approaches have been contributing to the service delivery of the Anganwadi centers. This would call for investments in high-quality interventions for young children and are therefore cost-effective ways of improving outcomes both for individual children, especially in the case of vulnerable or disadvantaged children, and for the society as a whole.

This paper also includes an operational model that could be implemented for "quick-wins" by leveraging technology to achieve short term and medium terms gains. The paper lays out activities that could be carried in a typical rural Aaganwadi settings and using ICT to enhance its current functioning. Finally, the paper concludes by suggesting pathways forward on the potential of using ICT for enhancing the quality of ECE.

Introduction

Early Childhood Education (ECE), also known as pre-primary or pre-school education, is the foundation of the child's educational journey. ECE encompasses an interlinked gamut of elements critical for a child's cognitive social and emotional development. It comprises learning, health, nutrition, play, and care, in an enabling and protective environment. The first six years of development in a child's life are critical to their overall development and well-being. Every stage of education that follows relies on its success. According to UNESCO¹, "Early childhood care and education is more than preparation for primary school. It can be the foundation for emotional wellbeing and learning throughout life and one of the best investments a country can make as it promotes holistic development, gender equality, and social cohesion". It can nurture caring, capable and responsible future citizens. Evidence on Early Childhood Education (ECE) suggests that children who engage in early and play-based learning activities have better developmental outcomes². The Lancet Series also stressed the importance of interventions that integrate nurturing care and protection for promoting child development in the early years (Britto et al., 2017). Good quality learning, early childhood, and early childhood development help to reduce the chances of dropout and repetition and improves outcomes at all level of education. Children enrolled in, at least one year of pre-primary education, are more likely to develop the critical skills they need to succeed in school and less likely to repeat grades or drop out.

In 2013, the government of India adopted the National Early Childhood Care and Education policy in recognition of the importance of investing in early childhood development. The Integrated Child Development Services (ICDS) is the program primarily responsible for early childhood development in India. ICDS is a unique program that encompasses human resource development, namely health, nutrition, and education. Pre-primary education is a vital activity under the ICDS program. ICDS provides health and nutrition services as well as preschool education via a network of Anganwadi centers. It is the largest early childhood care program in the world, reaching tens of millions of socio-economically disadvantaged children between the ages of zero to six, who are likely to benefit the most from early childhood education and nutrition programs³. It is with the help of the Anganwadi workers, that the services offered by the ICDS have reached across the lengths and breadth of the country. Their contribution is remarkable to the health, psycho-emotional, and social development of children, along with counseling, guidance, immunization drive, data collection, etc, in the nation.

ICT-driven innovative approaches have been contributing to the learning outcomes and especially the public education system of India. Digital tools like Smartphones have been leveraged in various domains, to improve service delivery and program management. Anganwadi workers have recently been technologically empowered by providing them with smartphones across the country. The vision is to support them in their daily routine tasks and prioritize essential ECE services. With financial investment and support, Anganwadi workers hold the potential to break the country's intergenerational cycle of under-education and poverty as well as cater to the inherent disadvantages that children from poor backgrounds face. As a primary interface of the rural communities, Anganwadi workers are critical to India's social development programs. Steps taken in the direction to empower and motivate them will set the stage for a positive transformation in the country's early childhood education sector. This paper discusses the potential smartphones hold for the early childhood education sector of India.

¹ <https://www.unesco.org/en/education/early-childhood>

² <https://www.thehindu.com/opinion/op-ed/a-model-struggling-to-deliver/article65315485.ece>

³ <https://www.povertyactionlab.org/evaluation/improving-early-childhood-development-supplementing-teaching-capacity-india>

Early Childhood Education

In India, Early Childhood Education (ECE) is provided by both the public school and the private schools through multiple models⁴. For urban and rural scenarios, different types of settings serve the growing need for early childhood education in the country. In urban areas, early education is provided by various playschools. In rural areas, early childhood educational needs are addressed through Anganwadis, under the Integrated Child Development Scheme (ICDS). These centers follow a pre-school curriculum, focused on hands-on activities that help children develop social, emotional, and physical activities. Evidence suggests that early childhood development has an impact on a person's income, health, and emotional well-being, thereby enabling them to achieve their full potential⁵. The India Early childhood Education Impact study⁶, conducted by the ASER center and the Centre for Early Childhood Education and Development, indicates that children who were exposed to high-quality ECE were more "school ready" than those who were not. The five-year longitudinal study tracked close to 13,000 children across 3 states in India and shows that building children's cognitive, pre-literacy, and pre-numeracy skills during the ECE stage improves their learning outcomes in early primary classes⁷.

The revised National Education Policy (NEP, 2020), envisages a five-year foundational stage of education, where the three years of early childhood education (ECE) is emphasized as a step toward children's fundamental right to Education. The policy proposes a "5+3=3+4" structure, where 3-8 years would be the foundational stage, 8-11 years preparatory, 11-14 years middle, and 14-18 years secondary. The early primary grades are proposed as a continuum of learning and referred to as the foundational stage of school, this had made early childhood education a part of formal schooling. The policy states "Universal provisioning of quality early childhood development, care, and education must thus be achieved as soon as possible, and no later than 2030, to ensure that all students Grade 1 are school ready"⁸. Such integration will formalize preschooling and enable better alignment of preschool and school curriculum to support all children in acquiring the required cognitive, pre-literacy and numeracy, physical, and socio-emotional skills to make the most of their schooling. This aligns well with the target SDG 4.2, "ensure that all girls and boys have access to quality early childhood development, care, and pre-primary education so that they are ready for primary education".

For the quality and curriculum of ECE, the National ECCE (Early Childhood Care and Education) framework lays down some priority areas for children. The government adopted the framework to promote inclusive, equitable, and contextualized opportunities for promoting optimal development and active learning capacity for all children below six years of age. The framework aims to attain optimal outcomes in the domains of physical and motor development, cognitive development, socio-emotional-ethical development, cultural/artistic development, and the development of communication and early language, literacy, and numeracy. Nutrition also plays a paramount role in the overall development of a child. The country's commitment to the eradication of malnutrition by 2030 is reflected in the launch of the National Nutrition Mission or POSHAN Abhiyan⁹, which strives to reduce the levels of stunting, under-nutrition, anemia, and low birth weight babies. The country has set the target to bring down stunting in children 0-6 years of age from 38.4% to 25% by 2022. Anganwadi centers are the focal point of delivery of health and nutrition services for pregnant women, lactating mothers, and children. The program, with the use of technology, convergence, and community involvement with a targeted approach strives to reduce the level of stunting, under-

⁴ <https://www.centersquarefoundation.org/foundational-learning/early-childhood-education/>

⁵ <https://assets.kpmg/content/dam/kpmg/in/pdf/2019/03/early-childhood-development-anganwadis-icds-ecosystem.PDF>

⁶ <https://www.unicef.org/india/media/2076/file>

⁷ <https://www.centersquarefoundation.org/foundational-learning/early-childhood-education/>

⁸ https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf

⁹ <http://poshanabhiyaan.gov.in/#/>

nutrition, also focusing on adolescent girls, pregnant women, and lactating mothers, thus holistically addressing malnutrition.

Anganwadi Workers for ECE

Anganwadi Services is India's one of the largest and most unique programs for early childhood care and development. The Indian Government's main delivery platform ICDS, is a centrally sponsored and state-administered early childhood development program, with preschool education as one of the six basic services. It is the foremost symbol of the country's commitment to its children and nursing mothers as a response to the challenge of providing pre-school non-formal education. ICDS provides a range of services across early childhood care and education and maternal and child health including preschool non-formal education, supplementary nutrition, health-related awareness, immunization, health check-up, and referral services. These are provided through a network of 1.4 million Anganwadis run by approximately 1.3 million Anganwadi workers and 1.2 million Anganwadi helpers catering to approximately 80 million children under six years of age.¹⁰ The beneficiaries of these services are children in the age group of 0-6 years, pregnant women, and lactating mothers.

The Anganwadi worker is the most important functionary of the ICDS scheme. The Anganwadi worker is a community-based from line worker of the ICDS program. Currently, 12.8 lakh workers and 11.6 lakh helpers work across different Anganwadi centers in India. Every worker is assigned around 250 homes and serves as the point of connection for families with different government schemes and programs.¹¹ They play a crucial role in bridging the gap between people and healthcare centers to accomplish the education, nutrition, and health needs of children up to six years¹². Some of their major roles and responsibilities are:-

- to elicit community support and participation in running the ICDS program,
- organize non-formal preschool, activities in the Anganwadi centers for children in the age group 3-6 years of age,
- organize supplementary nutrition feeding for children and expectant and nursing mothers by planning the menu based on locally available food and local recipes,
- to provide health and nutrition education and counseling on breastfeeding/ Infant & young feeding practices to mothers
- To make home visits for educating parents to enable mothers to plan an effective role in the child's growth and development with special emphasis on a newborn child

According to the official figures, AWWs currently deliver preschool services to about 330 lakh children¹³. This depicts the importance they hold in the children, especially from rural India, to prepare them to enter the formal education setting. Over the years, they have ensured last-mile delivery of ECE and educational schemes. As a primary interface of the rural communities, Anganwadi workers are critical to India's social development programs. It becomes crucial to leverage their vast reach by filling implementation and infrastructural gaps. There is a need to increase the honorarium of Anganwadi workers, build capacity and invest in research and development of a meaningful ECE curriculum. Empowering AWWs with digital literacy and tools is the need of the hour as early childhood development is emerging as a significant development driver in the Indian context. Reduction in malnutrition and improvement in school learning outcomes require interventions from the early years of a child to develop the requisite physical, social, cognitive, and emotional capabilities.

¹⁰ <https://assets.kpmg/content/dam/kpmg/in/pdf/2019/03/early-childhood-development-anganwadis-icds-ecosystem.PDF>

¹¹ <https://www.linkedin.com/pulse/empowering-anganwadi-workers-reinventing-rural-india-ashish-jhalani/>

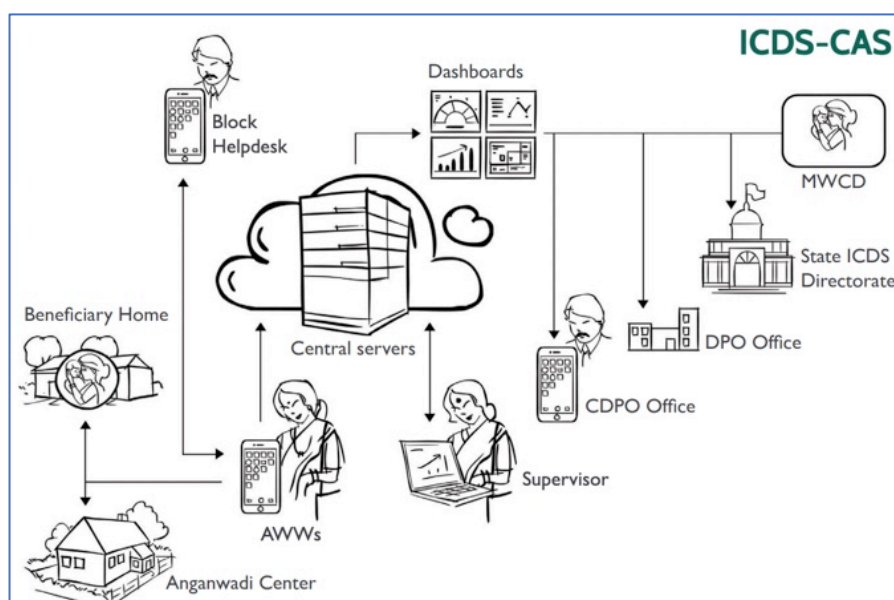
¹² <https://www.downtoearth.org.in/blog/governance/post-covid-19-e-governance-challenges-a-case-study-of-anganwadi-services-74701>

¹³ <https://www.linkedin.com/pulse/empowering-anganwadi-workers-reinventing-rural-india-ashish-jhalani/>

Smartphones for ECE

The use of ICT in the education sector has been playing a crucial role in providing new and innovative forms of support to the learning process. Smartphones have been the brightest spot in the journey of the digital revolution of the Indian Education Sector. New generation smartphones combined with stable internet networks have played a big role in the conceptualization of the smart education system. Indian Education sector, under the umbrella of digital initiatives, has launched various web/mobile-based ed-tech platforms, and tools and smartphones have played a major role in delivering them. For the primary education sector, smartphones are envisioned to help in delivering a meaningful early childhood education, with autonomy to reflect the local context and the setting. Recently, under the POSHAN Abhiyaan, Anganwadi workers have been technologically empowered with the provision of smartphones for efficient delivery. The mobile application of POSHAN Abhiyan digitizes and automates the physical process of data collection by the AWWs. This would save the time of AWWs and AHS, and improve the quality of their work while simultaneously allowing the real time-monitoring.

Smart Anganwadis have become the need of the hour, as early childhood development is emerging as a significant development driver in the Indian context. Mobile technologies will help in monitoring the progress of the beneficiaries, introducing key learning tools for enhancing the learning experience, and sustained capacity building of the field level functionaries with the latest teaching methodologies as well as digital monitoring tools. In 2016, the Ministry of Women and Child Development also launched the ICDS-CAS¹⁴, an ICT-enabled real-time monitoring system for strengthening the service delivery of AWCs across the country. It enables better supervision and monitoring and facilitates the use of data for decision-making. It also helps improve beneficiary outreach through direct system-generated SMS alerts. The application has a user-centric design, works both offline and online, is multilingual, and has features such as GPS tagging and multimedia. It supports the four key stakeholders, namely, the beneficiaries, the AWWs, the ICDS supervisors, and ICDS officials in different ways.



Source: [World Bank Group](#)

¹⁴ <http://icds-wcd.nic.in/nnm/ICDS-CAS.htm>

ICT is also being leveraged to strengthen and bring about transparency in nutrition delivery support systems. Leveraging the momentum, under the POSHAN Abhiyan, AWWs have been recently provided with smartphones and their supervisors with tablets, for efficient delivery. The Ministry of WCD has conceptualized a digital platform, "Poshan Tracker", which will be an overarching system, providing facilities, services, and inter-linkages, thereby also promoting real-time data with analytics. Technology under Poshan Tracker is being leveraged for dynamic identification of stunting, wasting, and under-weight prevalence among children; and last-mile tracking of nutrition service delivery. The Poshan tracker management application will provide a 360-degree view of the activities of the Anganwadi centers, service deliveries of Anganwadi Workers, and complete beneficiary management for pregnant women, lactating mothers, and children. The system will enable real-time monitoring and tracking of all AWCs, AWWs, and beneficiaries on the defined indicators. Anganwadi workers empowered with smartphones will take the country forward in the journey of quality health and nutrition for young children. The following session explores how smartphones have been and can further support the Anganwadi workers with their role in early childhood education.

Continues Support for AWWs

AWWs being the lifeline of community outreach and upliftment in the rural areas, need constant upscaling of their skills and knowledge. Even the NEP states "to prepare an initial cadre of high-quality ECCE teachers in Anganwadis, current Anganwadi workers/teachers need to be trained through a systematic effort following the curricular/pedagogical framework developed by the NCERT". The framework prepared a roadmap for the way ahead with an increased focus on foundational literacy and numeracy recommending a redesign of the curriculum for pre-primary and primary classes. This will include AWWs being trained in techniques of cognitive stimulations for infants and play-based and multilevel education for 3-6 years old children. The government also proposed to train them as per the curricular framework developed by the National Council for Education Research and Training (NCERT). This will help them to create a conducive learning environment.

Empowering AWWs with smartphones is a huge step in that direction. Their continuous training can be done with the help of the smartphone. This training can be designed to allow even new users to learn and assimilate at an easy pace. These smartphones, if pre-installed with the training modules in the native language, will strengthen their knowledge and skills about health and nutrition. Also, The availability of an in-built manual for using the ICDS-CAS software in the phones will make them more comfortable with the software. Training modules can be broken down into smaller forms, this will enable AWWs to pick up easily digestible learning tasks. Training in their vernacular languages will impart training to the Anganwadi workers to reach a wider number of beneficiaries. Smartphones with an inbuilt repository of resources on videos, and recipes about the hot cooked nutritious meal for pregnant women, lactating mothers, and children below 6 years, which could be shared further with the beneficiaries. Technology integrated well with the context of their regional areas will help them to build trust within their community.

Smartphones could become a strong tool for their continuous training, where they can access the training resources online, at their availability. The monitoring mechanism via smartphones can be a game-changer in identifying factors underlying progress in early childhood development and aiding timely redressal. Smartphones will also serve as a smooth channel to communicate with the training team for doubts and queries. It will offer a great platform to share the best practices across the country, this will be huge motivation for the workers. To be able to use mobile phones will generate a sense of empowerment for many Anganwadi workers, and they will be able to mobilize the community better.

Monitoring and Evaluation

Data and monitoring can be a powerful lever to encourage quality in early childhood education by establishing facts, trends, and evidence about whether children have equitable access to high-quality care and education. Research suggests that monitoring can help inform planning, contribute to more efficient resource allocation and increase cost-effectiveness.¹⁵ Smartphones for the Anganwadi workers will also support them further in the process of collecting and documenting the data. The ICDS software application facilitates the collection of the data by the frontline functionaries and a six-tier dashboard ensures the monitoring and intervention mechanism. It enables the monitoring of children with the help of auto plotting of growth charts on the application. The ICDS officials can then review the dashboard to monitor progress, identify gaps and take corrective action. The visibility of the data will also help to plan better and according to the shown trends. The application then generates the task list and home visit scheduler for enabling AWW to focus on the beneficiaries based on priority. The system also generates and shares SMS alerts for the beneficiaries and the stakeholders. All the dashboard data generated can be reviewed at the state, district, and block levels and will help with assessing performance and required actions.

Smartphones provided can be used to track the distribution of take-home rations and supplementary nutrition services. In states like Andhra Pradesh and Telangana, Anganwadi centers have been geotagged to improve service delivery. Gujarat has also digitized the supply chain of take-home rations and real-time data is being used to minimize stockouts at the Anganwadi centers. This might need some additional training of the teachers and the admin staff of the schools to use these applications or software. But this will help the system make evidence-based policy decisions to improve learning through effective collation and interpretation of data, enabled by technology¹⁶.

Parental and Community Engagement

Parents play a crucial role in the cognitive development of young children, their involvement in early childhood education can enrich the experience of a child in all aspects – social, emotional, and, mental. Thus, it becomes extremely important for AWWs to engage closely with the parents as well. Smartphones can be the bridge between the schools and the parents, providing them to participate in their children's school journey. Low tech solutions like IVR, YouTube, and WhatsApp are great in maximizing the outreach of distribution of learning content to children however, for children to use this content, it's important to motivate parents to use technology. Platforms like WhatsApp can be utilized for age-appropriate and play-based activities that parents can perform with their children using household materials. Anganwadi workers and community volunteers can play a strong role here to facilitate the tech interactions for parents and get them comfortable with it while making the tech-based learning models more effective. Literacy levels of the parents could be a potential hindrance in this process, especially for parents in rural areas where the majority of the parents have not received education themselves. Features like voice assistance, translator, or audio messages could be used well to overcome these challenges.

A blend of digital and in-person strategies can play a huge role in making parents participate in school activities. Parents can receive updates from the AWCs, not just about their children's academic status but also the important school activities. Such models with proven outreach can have auxiliary benefits for state education departments as they allow the dissemination of broader educational campaigns and can also be leveraged using low-tech innovations such as WhatsApp chatbots. A similar platform can be used for getting feedback from the parents as well. These assessments can then inform the strategy

¹⁵ <https://www.oecd-ilibrary.org/docserver/9789264085145-7-en.pdf?expires=1653472616&id=id&accname=guest&checksum=02F1AC9F7D8FB7A8927359E7D2C80F46#:-:~:text=Data%20and%20monitoring%20can%20be,of%20measures%20to%20achieve%20improvements.>

¹⁶ <https://development.asia/insight/keeping-track-school-performance-through-mobile-technology>

on content, and curriculum and also provides personalized feedback to children/parents in areas where skills/competencies are lagging behind the curriculum. A quality family-school partnership school community can play a significant role in the smooth coordination among all the stakeholders.

Ongoing ECE Initiatives

To meet the diversified demands for ECE, organizations across public, private, and non-governmental sectors have started various initiatives to provide quality early childhood education. Reduction in malnutrition and improvement in school learning outcomes require interventions from the early years of a child to develop the requisite physical, cognitive, and emotional capabilities. Equipping Anganwadi centers with digital technology and infrastructure to provide quality services is the need of the hour. Various innovations at the moment have proved to be successful in strengthening the delivery of early childhood development in the country. Some of such technology-driven interventions for early childhood education are discussed below.

Saksham Anganwadis

Under the umbrella scheme of Saksham Anganwadi and Poshan 2.0, the Ministry of Women and Child Development has launched the “Saksham Anganwadi and Poshan 2.0”. It is a strategic shift in mission mode to develop practices that nurture health, wellness, and immunity from malnutrition. To have a comprehensive strategy to address the challenge of malnutrition, supplementary nutrition under Anganwadi Services, a scheme for adolescent girls, and Poshan Abhiyan have been merged into Poshan 2.0, an Integrated Nutrition Support program. The existing Anganwadis will be upgraded to *Saksham Anganwadis* under the umbrella scheme of Saksham Anganwadi and Poshan 2.0. The new Saksham Anganwadis are envisioned as new generation Anganwadi with better infrastructure and audio-visual aids powered by clean energy and providing an improved environment for early childhood development. Technology under the Poshan Tracker will be leveraged for the management of the application and will provide a 360-degree view of the Anganwadi services. The system will enable real-time monitoring and tracking of all the beneficiaries on the defined indicators. It would allow for gathering the data, providing feedback to Program Managers, and documenting the impact of the scheme on the nutrition learning and nutrition indicators. This will help our decision-makers to make effectively timely interventions, based on the data from the tracker, continuous evaluation, and the progress of different components.

Smart Anganwadi Project

The Vadodara Municipal, Gujarat, initiated the SMART Anganwadi Project¹⁷ to improve the functioning and management of the Anganwadi Centres, and to improve the functioning and management of AWCs by way of digitizing the monitoring mechanism. It is done with the help of an Android-based mobile application that monitors the height and weight of the children, health status, delivery and consumption of milk and fruit, etc making it available to the AWWs on their smartphones for evaluating progress and identifying issues. The details like name, age, height, weight, etc are registered along with their photograph to an allocated zone. The data is then divided into three categories - red, yellow, and green. The real-time availability of the information will help the AWWs to identify serious cases and continuously follow up to improve the child’s well-being. The project is active in eight AWCs of the selected 87 high-priority Anganwadis in the city of Vadodara and is targeted to be rolled out to 303 AWCs of Vadodara.

¹⁷ <https://vmc.gov.in/pdf/Smart%20Anganwadi%20Presentation.pdf>

Project *Nand Ghar*

Project *Nand Ghar*¹⁸ is a partnership between the Ministry of Women and Child Development and Vedanta Foundation for building 4000 *Nand Ghars*, which are modernized Anganwadis equipped with upgraded infrastructure and innovative solutions for delivering ECD. They are envisioned to bring revolution in delivering early childhood, by collaborating with reputed partners for providing e-learning through television, pre-cooked nutrition, smart kits, and, AD boards as new-age learning tools, and a strong capacity-building model for enabling AWWs to deliver high-quality services. The *Nand Ghars* are currently operational across Rajasthan, Uttar Pradesh, and Madhya Pradesh, impacting more than 6,600 children and over 7500 women. The initiative is unique, as offers a next-generation infrastructure for the Anganwadi Centres, it is also providing cutting-edge services to children and pregnant and lactating mothers. Further, the initiative is also utilizing these centers as a “Village Resource Center”, wherein primary healthcare services for the community, skilling services for women as the main offerings, and other value-added services such as farmer training, English speaking classes, etc. are also provisioned. All this is done, leveraging the advanced digital monitoring tools, enabled through mobile applications to track and monitor actual on-ground operations and therefore initiate corrective measures, in real-time.

Anganwadi Education Transformation Program in UP

The Anganwadi Education Transformation Programme designed by EdTech company Square Panda India¹⁹ is a dedicated program to ensure quality education for the Anganwadi centers by upskilling the AWWs. The program currently is run in the Anganwadi Centres in Uttar Pradesh (UP). It aims to focus on the development of essential physical, cognitive, and socio-emotional skills in 3-6-year-olds with the help of audio-visual aids, storytelling, and a mix of modern and conventional methods. They run a program for upskilling the Anganwadi Workers. The goal is to empower them with holistic knowledge, in turn providing nourishment to the child in their care, for both the body and mind. Parents also play an important role in the home learning experience and are provided access to daily lessons and activities that have been mapped with the curriculum. WhatsApp is used to share these lessons with the parents. They also run an Educator Empowerment Program, which builds future-ready skills, empowering pre-primary, primary, and Anganwadi workers to effectively use modern, updated, and best global practices while teaching. The state government, partnering with SCERT and ICDS, has distributed a manual “*Pahal*” in all Anganwadi centers of 44 districts. The manual aims to facilitate the implementation of early childhood education-related activities and training of the workers. This will give the workers more opportunities to engage the child in school and give tasks for home learning. They will be engaged in the soft skills, new innovative ways of teaching the children, and build a better relationship with the parents. The use of digital technology will help them to increase their reach and awareness among the communities.

¹⁸ <https://nandghar.org.in/>

A Model Early Childhood Education Program using Smartphones in Aanganwadi Centers

As part of the project, “Delivering Next-Generation Public Services through Mobile Technology in India”, this component of the project leverages existing programs in place at the Aanganwadi Centers and proposes to enhance their efficiency to benefit the 3–5-year-olds using technology as the lever to make the delivery of the existing services more efficient. Our focus here is on the ECE component of the ECD approaches. Through this model, we plan to design a blueprint of making ECE delivery more efficient across the board, making Uttar Pradesh the lead State. As far as our information goes, the technology use that we envision has not been done so in any State in India so far. This technology-based blueprint will be tried and tested in UP first which will then be ready for other States to adopt.

We stress on the fact that the existing services can be enhanced and made more efficient using technology. Therefore, in this initial period of say, 6 months or so, we do not propose to introduce any new intervention, but use what is available to create an efficient delivery system using smartphones. For instance, technology can be used to make data entry digital. Learning can be enhanced using technology to provide more practice. Digital refresher teacher training will help to save money and time. Therefore, technology is used as a lever to enhance existing delivery systems. Once this system is set-up this can be scaled-up to many more districts and even across the States.

There are five components of this part of the project:

1. Aanganwadi Worker Training/Preparedness AWW/Teacher trainings are expensive and time intensive. However there has been no improvements in this traditional model of teacher training for decades. By using smartphones phones, the project will ensure that short modules and demonstrations of teachers doing LIVE teaching sessions will cut down on the travel time and the cost of teacher training drastically. The teachers could watch the teacher's pedagogical modules at their own time and rather than making use of the previous class time for training purposes. Short and long MOOCs could be developed based on the teachers' needs. These Massive Open Online Courses (MOOCs) will be free of charge and can be accessible on low internet bandwidth as well. Many existing platforms could be used to house these MOOCs such as UN Sustainable Development Solutions Network SDG Academy, UDEMY, EdEx and others. The teachers will be provided with updated teacher pedagogical approaches on a regular basis with practice modules and LIVE demonstrations to refresh the teaching practices.
2. Using smartphones to enable community outreach. Research suggests that Community/parental engagement is a big part of student success. Yet many times parental responsibility gets over as soon as the children enter the school door. Technology will help the parents familiarize themselves with the curriculum at the pre-school. The Community will play an important role in the interventions and the smartphones will play a big role in connecting with them to conduct home based education support, like reading stories in local language from the mobile phones. Recording the students' response on voice/video and creating a database on students' learning portfolio. Parents and extended families will be helpful to conduct AWC Readiness Camps and Summer Camps and all communications and preparations can go

through the mobile phones. Activities at the AWC Readiness Camp could be phone based too. If students are absent for a reason, the AWWs can use mobile phones to have communications regarding student absenteeism. This will probably be the first that the parents will find ways of regular engagement with the pre-school for academic purposes.

3. Curriculum Development on Early Literacy (Cognitive) and Social Emotional Competencies. Short stories could be developed that use the phone-based delivery system that could reach the parents. Stories could lead to more activities that could be done at the homes. Parents will be able to read the stories from their phones. In many cases we have observed that there is a dearth of educational materials at home. Phone-based story delivery could help in lowering that gap. In addition, AWWs will be given additional support on teaching early literacy using phone-based instructions. The literacy component will be substantially integrated into an online phone-based platform that could host a variety of teaching resources. This will help to supplement the existing materials (textbooks) by using videos of letter sounds, poems, and story stories. These phone-based additional reading material will provide the learners additional reading practice to improve local language fluency rates. This will have a dramatic impact on oral fluency even before they enter Grade 1. By following this model, the learning gap that exists in early primary grades can be easily avoided. Children will come academically prepared to enter primary schools.
4. Creating an AWWs community of practice: AWWs often feel overwhelmed and left out in the teaching process. AWWs could use phones as a medium to talk to other AWWs and learn from their teaching practice as well. This could become a part of a community of AWWs throughout the State who run aanganwadis. AWWs will be able to get a glimpse of other AWWs sharing their own curricular resources and teaching aids. They will be able to access videos on various teaching styles which will help to improve their own teaching practices. More importantly, they will be able to get motivated seeing others and also feel connected with the larger community to solve similar issues (e.g., student absenteeism, working with special needs children etc.).
5. Data driven Decision Making Using smartphones will help to digitalize the data from the aanganwadi and help to build a system of accountability around the metrics used. It will also help faster turnaround of data which can be used for faster remediation as well. Smartphones will help to track the learning progress on a periodic basis. These formative assessments will ensure that corrective measures can be taken in real-time. Records on paper take a long time to be entered and processed and therefore cutting the time by using real-time data collection on phones will aid in real-time remediation as well. Thus, an e-database will be ideal to track and point out the domain area that the learner needs additional support on. It will help to plan the accurate remediation and its impact on the learner's competencies. This database could be displayed on a platform showing the progress at the local level. Thus, key decisions on funding, education planning, administrative support needed will be based on real-time data.

This component of our project promises the use of state-of-the-art technology to make the existing services more impactful and cost-effective. The first few months (6-8 months) will help to digitalize the system to create a blueprint of technology aided pre-schools. To our knowledge, the use of technology has not been attempted to the fullest in the pre-school context yet. This will be the first time such a system will be attempted with the vision of scaling-up this system building approach. Instead of introducing new interventions in the ECE area, the first few months will help to build systems upon which ECE delivery can be made more efficient. This model will be a path-breaking

model in enhancing ECE delivery which could lead to a better school readiness process for millions of children in India.

Way Forward

A good quality (ECE) program will have a strong track record of ensuring a smooth transition from home or preschool to school²⁰. Getting the foundations right carries huge future benefits, better learning in school, and higher educational attainment, which results in major social and economic gains for society. A strong early childhood education system will support the children's growth and provide them with the knowledge and skills needed in their lives. This sets the stage for a positive transformation in learning outcomes throughout a child's lifetime. Although India has made great strides in improving access to preschool education, numerous challenges have to be addressed to enhance its quality. With limited infrastructure, learning aids at the centers, and a low enrolment ratio, the Anganwadi model has been struggling to deliver quality primary education. Multiple administrative duties also leave Anganwadi workers with little time to focus on the ECE. This calls for a high focus on strengthening the Anganwadi Centres in terms of infrastructure and human resources. The recent move by the Supreme Court to make the Anganwadi workers and helpers entitled to the payment of gratuity is a long-pending move to respect their work. This would help them to motivate and feel encouraged to keep doing what they do for the country.

Strengthening the ECE in India will need to build on three dimensions, children's readiness for school, school's readiness for children, and families' and communities' readiness for school by supporting learning through play activities at home and getting children ready for school, and transition from ECE to early grade learning. Investing in the foundations of learning, in quality early childhood education for all will be a solution to closing learning gaps, strengthening education systems, providing a solid foundation for human capital development, and supporting a country's goals for economic growth and development²¹. Failure to provide early childhood education limits children's futures by denying them opportunities to reach their full potential²². The country should give urgent priority to children currently enrolled in grades 1 and 2, who have never been to school or preschool. They need time and support to get "ready for school". The environment, inputs, and support that children receive in their first eight years will have an enormous impact on the rest of their lives – not only in terms of their performance in school but on a wide range of other outcomes that extend far beyond school.

Technology will play a very crucial role in the form of a swift and scalable solution for the government to improve learning outcomes at scale. Leveraging mobile technology for monitoring the progress of the beneficiaries and enabling trend analysis to understand the overarching factors influencing progress. Introducing key ages and stages tools as well as modern pedagogy and learning tools for enhancing the learning experiences of children. The curriculum should also meet the specific content and pedagogical requirements of this foundational stage with play-based opportunities and experiences for emergent and early literacy and numeracy and all-around development of the child. To support the foundational stage, developing a customized teacher education curriculum and the cadre of trained teachers at par in status with primary school teachers. Awareness in the community, policymakers, teachers, and others. Activities that should be prioritized and proactively supported include large-scale advocacy via public service messages and media campaigns, mechanisms that facilitate direct communications between pre-primary education programs and parents, and the design

²⁰<http://img.asercentre.org/docs/Research%20and%20Assessments/Current/Education/Research%20Projects/IECEIStudyReport2017.pdf>

²¹ <https://www.unicef.org/media/57986/file/Call-to-Action%20Statement-Early-Childhood-Education-for-All.pdf>

²² <https://www.unicef.org/education/early-childhood-education>

and large-scale dissemination of simple methods and materials that enable parents to actively support their children's learning.

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