Passive Solar Classrooms for Himalayan Children

Background

Early Childhood Education (ECE) is usually defined as schooling for children aged 4-6 years old, before they join formal schooling at Grade 1. These early years are important in the psychological and physical development of children, determining success in their future schooling years. During these years, children not only gain important physical and motor skills, but also emergent literacy skills such as phonological awareness, familiarity with print, and basic listening comprehension. Moreover, children enrolling in Grade 1 for the first time are assumed to already have somewhat mastered these skills.

Throughout Nepal, the state of ECE has dramatically improved in recent decades. Several Early Childhood Development (ECD) centers have been established in many rural communities. The government has also published many Early Grade Reading (EGR) materials. But most of these learning resources and the underlying curriculum have been developed primarily in the Nepali language. For non-native Nepali regions like Dolpo, very few resources exist for ECE. In fact, there are only a handful of ECD centers, although most of them are operated within the primary school.

Many children at Crystal Mountain School (CMS) in Dho Tarap are already 7 years or older when they first enroll in school. They are then placed in pre-primary classes, which have an inadequate number of teaching staff and very few learning resources. The classrooms are not designed for pre-primary education and are filled with students who are not in their age-appropriate classes; the national curriculum assumes students will be enrolled in Grade 3 or higher by the time they are 7 years old. There are many of these challenges not just in Dho Tarap, but throughout Dolpo. Additionally, the harsh geography and climate, especially during the winters, present even more challenges, described in more detail below.

This document first outlines some of the challenges ECE is facing in Dolpo. Some potential solutions are also presented. Then, a project is proposed to construct a passive solar ECD center serving around 50 students from Dho and Taksi villages in Dolpo Buddha Rural Municipality.

Challenges and Solutions

1. Winter-Proof and Pro-Winter Infrastructure
Very few schools in Dolpo are able to run during the winter due to harsh and cold climate conditions and inadequate infrastructure. While CMS and a few other schools run some form of winter school, the normal academic calendar and curriculum is barely followed as most government and private teachers leave the schools. Moreover, winter classes are mostly run for older students who are more physically capable of bearing the harsh winters, and walking to schools or designated greenhouses. As a result, pre-primary and primary grade students are at school, if at all, for about 6 months only. The large gaps between academic sessions especially hamper the learning achievements and development of young children. Therefore, school infrastructure must be designed to be winter proof which would allow schools to run for the entire academic calendar year.

Several options are available for such infrastructure, including equipping buildings with heating technologies. However, most of these options require the use of large amounts of electricity or some other fuel source. Due to basic infrastructure challenges in Dolpo, including lack of grid connected electricity and basic roads for transport, any solution to be deployed in Dolpo needs to optimally use available local human and natural resources, and be affordable and sustainable. This is also especially important to avoid destroying the local architecture and living practices, and to help increase resiliency towards effects of climate change.

![Fig 1: Basic principles behind passive solar design](https://carbontrack.com.au/blog/passive-solar-design/)

Following examples of places like Ladakh which have similar geography and culture, passive solar technology can be the most effective, earth friendly, sustainable and affordable platform to design learning centers for early childhood education. Vision Dolpo had the opportunity to take 4 students on a visit to SECMOL in Leh, Ladakh in December 2017, where we stayed in passive solar houses that were earthquake resistant in comfortable temperatures of about 15-20 degrees even when outside temperatures were sometimes lower than -25 degrees. Such solar houses use the energy of the sun to keep inside temperatures warm and are made with available local resources. Although Dolpo presents challenges like lack of roads and wood, passive solar has great potential for not only building school infrastructure but also other public services buildings and even private homes.

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To encourage and engage local youths, students and employees during the winters, schools should also be equipped with additional infrastructure and programs that take advantage of the winters. Programs like ice hockey and ice skating, skiing, and building of artificial glaciers (Ice Stupas) will not only help engage students and local community members but also provide students the opportunity to learn to mitigate climate change effects and develop physically and psychologically. Vision Dolpo will also be working on some of these programs in the near future.

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2 Ref: https://worldarchitecture.org/architecture-news/epefn/terraawarded_secmol_school_in_leh_is_epitome_of_rammed_earth_passive_solar_architecture.html

2. Local Human Resource Development, Hiring and Retainment

One of the primary challenges for schools in Dolpo has been the development of skilled local human resources. Non-local teachers, including government appointed teachers, are difficult to retain, quality control, or to motivate properly. It is thus essential to prioritize the development of skilled local teachers and staff. This will also help in the implementation of the local curriculum taught in the local dialect.

3. Localized Curriculum and Early Grade Reading Materials

Countless research studies have shown, and as acknowledged in the latest versions of the national curriculum of Nepal, it is vital for young children to get their education in their local dialect (even for learning second languages) with a curriculum that is locally relevant and contextual, and follows Universal Design Principles for learning. Currently, although Tibetan is taught as a language in schools, including primary and secondary schools, the primary language of instruction in most of Dolpo is either Nepali or English. Moreover, very rarely does the standard national curriculum respect or recognize the local histories and lived realities of the students. This puts the students at a significant disadvantage to students in other regions where the mother tongue matches the primary language of instruction.

Early Grade Reading materials like picture story books and colorful workbooks in Tibetan need to be developed along with a flexible local curriculum that fits the needs of the students and the communities. Adequate research and input from local community members, early childhood education experts, and local administrators will be needed.

4. Impacts of Covid-19 and Importance of Parental Engagement

Covid-19 has been specially challenging to people in regions like Dolpo, which lack the most basic of health and other infrastructure. Schooling has been disrupted in most schools. Several plans and projects, including this one, have been delayed.

However, Covid-19 has also brought to attention the importance of parental engagement in children's education. Especially for pre-primary children, due to their need for proper nutrition, basic behavioral education and support at home, parental engagement in their children's mental and physical development is crucial. Moreover, as most schools in Dolpo including CMS are able to offer residential services only to students in grades 4 or above, pre-primary and primary grade children spend the most time at home every day. The problems are compounded because few parents have the time or the knowhow of assisting in their children's education.

This calls for continuous training and engagement with parents and community members to assist in their children's education. Families need to be empowered with knowledge and sustainable and
affordable resources, like digital learning resources from OLE Nepal that can be accessed via mobile phones and tablets.

Pilot ECD center in Dho Tarap Valley

The proposed project for GlobalGiving’s accelerator program will build an ECD center in Dolpo Buddha RM, serving around 50 students of ages 4-6 years. In line with our vision of promoting and developing sustainable green technologies to improve the lives of people in the high himalayas, passive solar building experts (for e.g. from Ladakh) will conduct research in the proposed locations. They will work together with curriculum experts and local community members to design passive solar heated ECD centers that are suited to learning for children aged 4-6 years old. Emphasis will be given to ensuring that the ECD centers are sufficiently heated passively by the sun to operate under normal temperatures inside the classrooms. The work on this project will provide valuable experience and opportunity to promote passive solar designs for all types for building constructions in Dolpo.

Each center will be run by a trained early grade teacher and assistants, with at least one local staff from each of the wards in each center. Adequate EGR learning materials and resources for the teachers will be provided. Until the development of a curriculum that is locally relevant and contextual to Dolpo, the centers will supplement the standard national curriculum with the teaching of Tibetan language, local stories and customs.

The centers will also be equipped with digital learning resources from Open Learning Exchange Nepal (OLE Nepal), which include EGR learning resources like digital stories and games in Nepali language. To aid learning at home and engage both students and parents in early education while mitigating some of the challenges of Covid-19, a tablet sharing program will be run by both centers allowing parents to borrow tablets equipped with digital learning resources. The centers will be in-charge of running the program in their respective wards. This pilot program will also include workshops for parents and teachers to provide adequate training on the usage of digital media in line with WHO guidelines on screen time usage for children, as well as on the general importance of early childhood education.

Nutrition Program and Indoor Vegetable GreenHouse

The ECD center will also run a nutrition program to aid in the proper physical and mental development of children. Children will be provided nutritious food, focusing on locally grown grains and vegetables supplemented by any necessary imported food. The ECD center will be
equipped with indoor greenhouses that the teachers and the students will use to plant vegetables. Inspired by similar projects in Ladakh, the greenhouses will be made such that they are able to produce leafy vegetables during the winters as well.

Such spaces will not only serve to aid in the nutrition program but also as valuable learning resources for the children.

Local Stories Collection and Curriculum Design

Additional workshops for parents and community members will be run in the proposed wards of the rural municipality, that will primarily focus on collecting and creating children stories in the local language based on local history, customs, and surroundings. Local artists and storytellers will edit the stories and bring them to a final form for print. The program aims to produce 10 such stories. Preparations will also be made to work with OLE Nepal to digitize the stories for use in the learning tablets (as well as android phones) and for wider distribution throughout Dolpo.

To replace the temporary curriculum in the near future, curriculum experts will work together with the teachers and local community members to research and draft a comprehensive local curriculum for early childhood education in Dolpo.