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Editorial Words

Dear Distinguished Readers,

In the realm of academia, where the pursuit of knowledge and the sharing of wisdom take center stage, we are delighted to introduce the second issue of Volume 27 of the ASEJ Scientific Journal. This publication, in partnership with the Bielsko-Biala School of Finance and Law, continues to serve as a repository of intellectual exploration and a testament to the wealth of contemporary research.

Within the pages of this volume, a diverse collection of scholarly articles awaits. Each article represents a facet of our collective commitment to understanding the intricate tapestry of global concerns. From the realm of education to the intricacies of energy security, from the digital landscape to geopolitical intricacies, these articles provide valuable insights and open doors to meaningful discourse.

The essence of this volume lies in its unwavering dedication to furthering our comprehension of complex subjects. These articles, penned by experts and scholars who are leaders in their fields, are a testament to the rigorous examination and exploration of topics that resonate with our ever-evolving world.

As you embark on this intellectual journey through Volume 27, No. 2, we invite you to consider the broader tapestry of knowledge it presents. Each article adds depth and dimension to the ongoing conversations surrounding the most pressing issues of our time. Together, they form a mosaic of thought, offering fresh perspectives, innovative solutions, and a deeper understanding of the complexities that define our contemporary world.

These articles are more than words on paper; they represent the collective pursuit of wisdom and the desire to share it with our readers. In each piece, you will find the dedication of researchers who have invested their time, expertise, and energy to illuminate the issues at hand.

We encourage you to engage with these articles, to discuss and debate their findings, and to contribute to the ongoing dialogue that drives the pursuit of knowledge. We trust that this volume will not only inform but also inspire, and that the insights it offers will be a valuable addition to your intellectual journey.

The imperative role of risk management in ensuring the security of logistics processes within small service enterprises is illuminated, emphasizing the significance of mitigating risks in this sector. Safety management in the context of ISO 9000 quality management systems is dissected, underscoring the pivotal role of these systems in ensuring the safety and quality of organizations.

We invite you to immerse yourselves in this eclectic collection of scholarly works, each a beacon of knowledge and insight into these crucial subjects. The articles contained within this volume aspire to stimulate discussion, foster a deeper understanding, and inspire further exploration. We trust that the journey through these pages will be an intellectually enriching experience for all our readers.

Doc. Dr Kateryna Pilova
Editor of the ASEJ, Issue 2, Volume 27, 2023.

Basic education improvement: A case of two High Schools in Tanahu, Nepal

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Abstract **Improving basic education in High School is critical for developing skilled manpower. Two High Schools, Shree Jana Jukta Shai Secondary School and Shree Udaya Secondary School, in Tanahu, Nepal, have recently started their intermediate and technical education programs in veterinary science, civil engineering, and agriculture. This study was done to better understand basic education improvement opportunities and challenges in these two High Schools. We assessed needs and identified academic activities for basic education improvement. Accordingly, we developed basic science and engineering laboratories and E-Learning facilities in these two High Schools, conducted a two-day teacher's training and classroom teaching demonstration, and organized a three-day adult science literacy training in the communities. Topics covered in the teacher's training and adult science literacy events primarily included related to agriculture, environment, and climate change. The effectiveness of the basic education improvement program was assessed through observation, key informant surveys, group discussion, and feedback from teachers, students, and local communities. The program successfully developed basic science education in these two High Schools and enhanced adult science literacy in the communities. These activities are expected to increase basic and applied science literacy on agriculture, environment, and climate change among students and teachers in Tanahu, reduce gender-based and caste-based disparity in education by lowering girl dropout rates, and connect High School learning to job markets to career-minded students. It is recommended that basic education improvement activities that were carried out in the two High Schools should be scaled-up to cover the whole Gandaki Province and other regions in Nepal.**

Keywords— Basic Education, Science Laboratories, Survey and Engineering, E-Learning, Adult Science Literacy, High School Education, Rotary, Nepal.

I. INTRODUCTION

Technical and vocational education and training (TVET) supports economic growth and promotes equality and equity. TVET programs emphasize education for occupational or hands-on skills, and in developing countries, it's primarily situated as either an addendum to secondary education or, within the post-secondary education context, as an alternative to university training (Hoffman 2011). Nepal is an agricultural country where nearly two-thirds of the country's population is engaged in agriculture and depends on food

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imports, and the issue of food security has become a national concern. Similarly, environmental pollution due to vehicular emissions, dust, pathogens, nutrients, sediments, chemicals, and other pollutants in soil, water, and air is a major problem. In addition, as Nepal is one of the most vulnerable countries to climate change impacts, grassroots activities on climate change adaptation are urgently needed (Poudel, 2015). Academic institutions and educational systems are critical in preparing citizens for effective problem-solving in a nation. Developing workforce that is capable of solving current agricultural, environmental, and climate change problems is an urgent need in Nepal. In addition, gender and caste-based academic disparity exist in many parts of Nepal. Caste-based discrimination is illegal in the country but the problem is deep-rooted in the society. As a result, underprivileged and *dalit* (sadly, so-called lower caste or untouchable) students have a very high dropout rate. TVET also allows students to go into the workforce right away and, therefore, potentially reducing the caste-based and gender-based disparity. In 2015, Nepal was hit hard by a M7.8 earthquake and its aftershocks. The quake killed over 9000 people, destroyed 8000 schools, and damaged more than 25,000 classrooms. In addition to rebuilding other infrastructures in the region, improvement of laboratory facilities and enhancement of the technical skills of High School graduates are critical for recovery. The COVID-19 pandemic has added another complexity to the rebuilding processes as well as the overall economic development of Nepal.

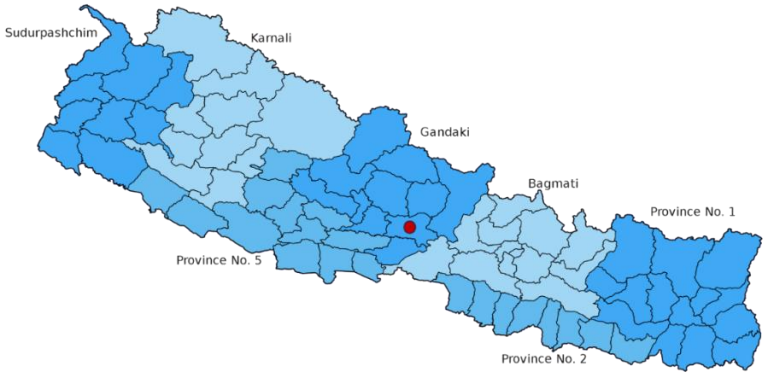
Recognizing the importance of TVET in tackling those problems, including addressing the high unemployment rate, promoting economic development, reducing poverty, empowering women and *dalits*, and preparing for the future, the government of Nepal established the Council for Technical Education and Vocational Training (CTEVT) as an apex body for TVET in Nepal. CTEVT plays an important role in developing Nepal's economy and helps meet the labor market's needs by providing skilled workers in many sectors (CTEVT). Some of the CTEVT programs include a diploma in technical education (grades 11 and 12, often known as +2 in Nepal, and an additional year) in a range of topics such as Engineering, Health Sciences, Agriculture, Business Management, Tourism and Hospitality, Information Technology, Forestry, Automobile Engineering, Civil Engineering, and Electrical Engineering. CTEVT offers these basic education and skill courses primarily from community schools (high schools) that offer short-term technical education and vocational training (TECS) programs. Currently, CTEVT offers diplomas in over 500 community schools (Rijal and Rijal, 2020). A lack of adequate infrastructure, such as classroom facilities, laboratory equipment and materials, E-learning facilities, and trained teachers, has challenged the efficacy of these CTEVT programs.

To address some of these challenges, we initiated Rotary International's Global Grants program at two schools, Shree Jans Jukta and Shree Uday Secondary Schools, in Tanahu, Nepal. The selected two schools offer CTEVT Diploma in Veterinary Science, Agriculture, and Survey and Engineering. Our focus was providing laboratory equipment, establishing e-Learning Centers, organizing teacher's training and adult science literacy training, and classroom teaching demonstrations. The specific objectives of this study were 1) Enhancing the quality of basic and applied science education in High Schools by improving educational infrastructures, including science labs, classroom facilities, and E-learning, 2) Training teachers for basic and applied science laboratory skills and E-learning, especially on agriculture, livestock management, environment, and climate change adaptation, and 3) Increasing basic and applied science literacy among adults in the community, particularly on agriculture, environment, and climate change adaptation. In addition, our efforts help understand the strengths, challenges and improvement measures of the program. We intend this program to scale up to all other vocational schools and we focus on improving the overall implementation and increasing the efficacy of the program, and expanding the program to other CTEVT schools.

II. Selection of High Schools/Programs

We selected two High Schools in Tanahu, Shree Jana Jukta Shai Secondary School and Shree Udaya Secondary School, which have recently started intermediate and technical education programs in veterinary science, civil engineering, and agriculture with approval from CTEVT.Both the schools are located about 2-5 kilometers from Damauli, the district headquarters of Tanahu district in Nepal (Fig. 1). These programs have been quite successful in recruiting students nationwide, and the graduates from these programs are already working in construction, irrigation, sanitation, animal husbandry, and in many other areas in several districts in Nepal. The three-year veterinary program at Shree Jana Jukta Shahi Secondary School have attracted almost half of its students from outside Tanhau district such as Rautahat, Parsa, Sarlahi, Nawalparasi, and Humla. Total number of students in this program currently is 20, 13 boys and 7 girls. Since the program is in its second year, there is growing interest among students in this program in many parts of the country. Similarly, the 18-month technical education in civil engineering at Shree Udaya Secondary School, which started six years ago, has drawn students from Tanhau, Gorkha, Kaski, Lamjung, Dolpa, Humla, and Mugu districts. Interestingly, of the total students enrolled in this program, 42% is girl and 35% dalit. Dalit girls occupy 40% of the total female population in the program or 17% of the total student population in the program, which is very impressive. Annual enrollment over the past 6 years in the program has averaged 40 students. Graduates from this program are working in road and building construction, water supply and irrigation, sanitation, construction of bridges, and government offices, and some of them have established their businesses. There is growing interest in students enrolling in this program nationwide. Two years ago, Shree Udaya Secondary School also got permission to conduct a three-year diploma course in agriculture (I.Sc Ag). This school will admit its first batch of three-year diploma in agriculture students very soon. Procurement of necessary logistics and the recruitment of teachers for the program is underway. As the district of Tanahu lies in the central part of Nepal from east to west, and in the mid-hill region, access to these programs is geographically convenient for interested students from all over the country.

FIGURE 1. RED CIRCLE SHOWS THE LOCATION OF SHREE JANA JUKTA SHAI HIGH SCHOOL AND SHREE UDAY SECONDARY SCHOOL IN TANAHU, NEPAL.



Source: https://commons.wikimedia.org/wiki/File:New_Map_of_Nepal_District_and_Province.svg)

III. NEED ASSESSMENT

To understand the strengths, weaknesses, and resource needs for improving basic education as well as to fulfill Rotary's GG requirement, we conducted a need assessment of both High Schools using methods such as laboratory and classroom visits, community meetings, and expert consultations. Along with local government officials, schoolteachers, Headmasters, members of the School Management Board, members of local communities, including the local and International Rotary members, local NGO Asta-Ja RDC, and parents were involved in need assessment meetings. Table 1 lists the needs, strengths, challenges, and opportunities for basic education improvement in Shree Jana Junkta Shai High School and Shree Uday Secondary High School. (Table 1).

Shree Jana Jukta Shai High School has a decent population base and flow of school children. It has 1835 households with a total population of 9175 in its school catchment area. The population distribution includes indigenous people 40%, dalit 20%, and other 40%. School runs from Early Childhood Development (ECD) to Grade 12. Total number of students is 450 with 60% girls and 40% boys. Similarly, the school catchment area of Shree Uday Secondary School contains 1300 households with a total population of 6500. The population distribution of the school catchment of Shree Uday High is indigenous people 75%, dalit 15%, other 10%. This school also runs sfrom ECD to Grade 12. A total number of students is 393 (almost all from indigenous and dalit communities), 60% girls and 40% boys.

Community members stressed the presence of highly fertile agricultural lands but lacked agricultural commercialization. They emphasized the need for commercialization of high-value agricultural and livestock production for income generation. They also stressed the need for building science laboratories and engaging parents and local communities in basic and applied education. Additional needs they identified include 1) supplying clean drinking water to school children, 2) sanitation facilities, 3) income-generating activities for parents so that they can manage their day-to-day life and send their children to school daily, 4) quality education, 5) promotion of local culture, 6) employment generation, 7) public awareness on quality technical education, and 8) student from dalit community should not be discriminated as dalit student in school and they should be taught in simple language with experimental materials because they come from family backgrounds lagging behind in education. In general, schools and the locals involved in the need assessment were less experienced in specifications and specific items needed for school labs. International experts provided needed help.

TABLE 1. SCHOOL NEEDS, STRENGTHS, CHALLENGES, AND OPPORTUNITIES FOR BASIC EDUCATION IMPROVEMENT IN SHREE JANA JUKTA SHAI HIGH AND SHREE UDAY SECONDARY SCHOOLS IN TANAHU, NEPAL

	Shree Jana Jukta Shai High School	Shree Uday Secondary School
Need	State-of-the-art science laboratories focused on agriculture and eLearning facilities for technical skills development. Increasing enrollment by promoting technical education and laboratory facilities Orientation for students and parents in science education and laboratories Developing a children-friendly school environment (drinking water and sanitation, teachers' training, parent involvement) Playgrounds Irrigation facility for school garden	State-of-the-art science and engineering laboratories and eLearning facility for technical skills development Increasing enrollment by promoting technical education and laboratory facilities Developing a children-friendly school environment Drinking water supply Health services Agricultural and livestock production training for the community
Strengths	Presence of capable science teachers for managing technical laboratories Very supporting local communities and parents for technical education Sufficient feeder schools and a growing population for increasing student enrollments	Presence of capable science and engineering teachers for managing technical laboratories Very supporting local communities and parents for technical education Sufficient feeder schools and a growing population for increasing student enrollments

	Shree Jana Jukta Shai High School	Shree Uday Secondary School
	Availability of space for setting up laboratories and school facilities Excellent school building Active community members	Availability of space for setting up laboratories and school facilities Excellent school building
Challenges	Parents are largely farmers and wage earners and cannot support their children for school education Integration of the daily routine of the household activities and student's school attendance Boosting enthusiasm of school teachers in basic education Increasing community awareness in supporting school programs	Parents are largely farmers and wage earners and cannot support their children for school education Integration of the daily routine of the household activities and student's school attendance Boosting enthusiasm of school teachers in basic education Financially strong parents send their children to private schools in nearby Damauli town
Opportunities	Community donations as laborers for construction work Presence of local CBOs, NGOs, Mother's Groups and other user groups who can help in education Strengthening relationship between school and local communities, and governmental agencies for basic education improvement	Services from local communities as laborers for construction work Presence of local CBOs, NGOs, Mother's Groups and other user groups who can help for education Strengthening relationship between school, local communities, and governmental agencies for basic education improvement

IV. Basic education improvement activities

With the main goal of supporting basic and applied science education for career-minded students and increasing science literacy in general, five different basic education improvement activities were identified for intervention (Fig. 2). The expected outcomes of these activities also include a reduction in gender-based and caste-based disparity in education, science, and technology in particular, and lowering girl dropout rates by providing practical education, improving academic environment, and effective classroom teaching. These schools have demographically interesting enrollment. On average, 42% of total students enrolled in these two schools are girls, which is low compared to the national average of over 52%. Sadly, 35% of the enrolled students in these schools are dalit, so-called lower caste people in Nepal. The dropout rates among girls is very high due to several factors, including gender violence, child and early marriages of girls, and caste discriminations, and lack of skills for jobs after High School. There is a very low level of educational aspiration among students largely due to the lack of practical and applied knowledge and skills in high school teaching and learning. I. Laboratory development

While developing laboratories, it was taken into consideration that the lab supplies purchased will support developing basic and applied science and technologies including laboratory determinations of soil, water, livestock, and other environmental samples from the community. Thus, school laboratories can support the conservation, development, and utilization of natural resources such as soils, water, and forages in the locality. Laboratory facilities for soil, water, plant and livestock analyses are very limited in the country. In addition, students and teachers who are involved in community sample analyses will be knowledgeable of the local communities and will develop invaluable skills and expertise in the region. According to Poudel et al (2005), hands-on activities for middle school and high school students are critical for developing student's abilities for critical thinking, motivation, and interest on agricultural and environmental problem-solving. Table 2 shows the list of major equipment supplied to the schools for laboratory build-up. Both the schools also received additional chemicals and laboratory accessories that were necessary for the lab to be fully functional.

Figure 2. Basic Education Improvement activities identified for Shree Jana Jukta Shai High School and Shree Uday Secondary School in Tanahu, Nepal

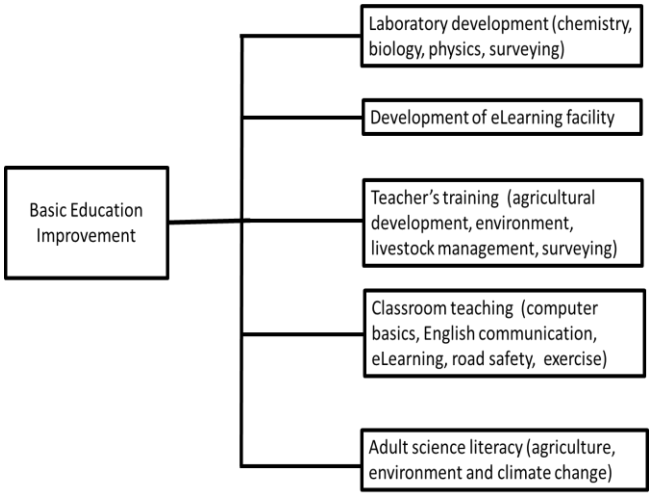


TABLE 2. LIST OF THE MAJOR LABORATORY EQUIPMENT SUPPLIED TO SHREE JANA JUKTA SHAI HIGH SCHOOL AND SHREE UDAYA SECONDARY SCHOOL IN THEIR LABORATORY DEVELOPMENT

Laboratory	Shree Jana Jukta Shai High School	Shree Udaya Secondary School
Chemistry	pH Meter, Conductivity Meter, Hydrometer, Digital Balance, Water Bath, Titration Apparatus, Micropipette, Thermometer, Desiccators, Funnels, Tubes, Bottles, Glass Jars, Flasks, Cylinders	pH Meter, Conductivity Meter, Hydrometer, Digital Balance, Water Bath
Biology	Burdyazo Castrator, Simple Microscope, Compound Microscope, Dissecting Box, Digital Calorimeter, Digital Colony Counter, Model and Charts, Specimens, Insect Box, Mac Master Slide Counter	Simple Microscope, Compound Microscope, Dissecting Box
Physics	Hypsometer, Copper Calorimeter, Jule Calorimeter, Hot Plate, Mirrors and Lenses, Ammeter, Voltmeter, Galvanometer, Magnetometer, Potentiometer, Bar Magnate, Battery Charger, Bunsen Burner, Spherometer, Wires, Rheostat, Android Barometer	Telescope with Stand, Bicycle Dynamo, Solar and Lunar Eclipse, Rain Guage
Engineering		Total Station, Theodolite, Prismatic Compass, Survey Compass, Levelling Machine
Soil and Water	UV Spectrophotometer, Nitrate Electrodes, Flame Photometer, Bulk Density Sampler, Sieves, DO Meter, Turbidity Meter, Oven, Pump, Soil Auger, pH Meter, Conductivity Meter, Hydrometer, Digital Balance	

I. E-Learning

E-learning facilities were developed and handed over to both High Schools. The E-Learning Centers were equipped with computers, projectors, comfortable furniture as well as convenient child friendly classrooms for modern learning methods. Each center is constituted of a classroom with a student capacity of 30 students. Each center was furnished with a Desktop computer - Dell Optiplex 1 TB hdd, 16 gm Ram, Projector Epson or Hp or Dell minimum 32k Screen, Camera, Microphone, Speaker and other accessories - Screen at least 6 feet, wireless microphone with noise cancellation and Stereo speaker that covers the whole room. Teachers and parents of both schools believe that the e-learning center will enhance the quality of future teaching and learning and the quality of the school education.

II. Teacher's training

Seventeen teachers representing 16 High Schools in the district attended a 2-day teacher's training program at Shree Jana Jukta Shai High and Shree Uday schools on December 11 and 12, 2023. It involved hands-on teaching to improve their laboratory skills in relation to biology, physics, chemistry, surveying, and applied fields such as agriculture and environment. A teacher's training manual was developed and distributed to the participants. The teacher's training manual included topics on applied science such as soil quality, agroforestry, organic agriculture, goat farming, climate change adaptation, hydrology, and forages. Training outcomes included generating new enthusiasm among teachers for effective teaching, professional development of teachers, increasing their scientific knowledge and improving their teaching techniques. The trainers explained and demonstrated the operation of major laboratory equipment related to veterinary science, agriculture, and surveying. Participants learned about laboratory projects relating to the sampling and laboratory determinations of various samples and the use of equipment. Participants also carried out field studies using appropriate instruments such as surveying, soil and water sampling, and castration. Participants shared field and laboratory data from each of the groups, analyzed, synthesized, and presented the results. Specific topics introduced to the participants include soil and water tests, organic agriculture, sanitation and septic systems, public health, soil erosion control, Integrated Pest Management, post-harvest management, sanitation, water recycling, livestock diseases and parasites, evaluation of animal health, and fodder trees and grasses. Additional environmental topics covered in the training included area calculation, units and conversions, use of survey equipment, GPS, measurement of slope and elevation, river velocity and cross-section determination, and development of maps using surveying tools and ancillary equipment.

III. Classroom teaching

Five different classroom teaching demonstrations were done in Shree Uday Secondary School and in Shree Jana Jukta Shai High in Tanahu, respectively on December 11 and December 12, 2023. This one-day five classroom teaching demonstration included classes on computer basics, English communication, eLearning, road safety, and exercise. Twenty students from 9th – 12 grade participated in each of these classroom teaching demonstrations. Each class was run for four hours with breaks every 60-70 minutes. In computer basics, students learned word processing, PowerPoint slides, Excel database, and file management. Similarly, in E-Learning, students learned basics on Zoom meetings, internet access, messaging, Google docs, screen sharing, file conversions, You-tube, FaceBook, Google Chrome (Drive, Docs, Sheets), and recording. In English communication, students learn communication language for daily life. In road safety, students learned about traffic rules, road hazards, and safety tips. Subject matter covered in road safety training included adolescent behavior when crossing the road behaviors that increase the risk of road injuries, understanding where to walk safely, student health and well-being, environmental factors, road conditions, neighbourhood maintenance and road infrastructure, and road safety features.

The presentation addressed urban roadways with traffic lights, sidewalks, crosswalks, signage, road reflectors and painted traffic white and yellow lines.

Similarly, in exercise, students learned about physical and mental health, nutrition, daily exercise, and fitness. Through this classroom teaching demonstration, students were encouraged to reuse and recycle, especially plastic, and to clean up the area around their school and homes. These classroom teaching demonstrations were very useful for the students to gain a comprehensive view of practical education, communication, information technology, road safety and physical and mental fitness. We learned that students could be taught all matter of subjects through both visual and audible methods.

IV. Adult science literacy training

Three one-day adult science literacy trainings were conducted at three locations, one each in Shree Jana Jukta Sahi High School, Shree Uday Secondary School, and Shree Padma Elementary School in the area. Twenty adult members from the surrounding participated in each training. Adult science training sessions were organized on three topics: 1) Goat keeping, 2) Agroforestry intervention, and 3) Group discussion and reporting by the participants. Each topic took 60-70 minutes time. Women participants were in the majority in each of the three trainings. Each participant was provided with an adult science literacy manual for better understanding. Table 3 summarizes questions that trainers raised and answered during these training sessions. At the end of the training, adults in the community were able to: 1) Understand scientific terms in relation to agriculture and environment, and 2) Comprehend the status of their natural environment in relation to climate change impacts and community resiliency. One of the most impactful aspects of the adult science literacy training was witnessing the participant's progress and their growing confidence in the classroom. The women especially, were very interactive. Participants liked the training very much and they even asked for similar frequent training in the future.

TABLE 3. A GENERAL LIST OF QUESTIONS ADDRESSED DURING ADULT SCIENCE LITERACY TRAINING SESSIONS IN TANAHU, NEPAL, DECEMBER 11-13, 2023.

	Questions
Agriculture	What is soil? What is the importance of soil? How can we improve soil productivity? What are the major properties of soils? What is biochar? What are the benefits of biochar? How can we make biochar? Why do we need Organic Agriculture? How can we manage plant nutrients for major crops? Why do we need improved forages? What are the major high-quality perennial fodder trees?
Environment	What is the environment? How many different types of environments are there? What is the physical environment? What is the biotic environment? What do we mean by cultural/social environment? What are the reasons for environmental degradation? What are the consequences of environmental degradation? What is acid rain? How is acid rain harmful? How can we protect our environment? Why do we need gender inclusiveness in environmental protection?
Climate change	What is the climate? What are the greenhouse gases? What are the sources of greenhouse gases? What are the effects of climate change? How can we minimize the impacts of climate change?
Agroforestry	What are the objectives and the significance of agricultural forestry? What are the different types/systems of agricultural forestry? How can agricultural forestry minimize the impacts of climate change?

I. EXCHANGE OF KNOWLEDGE, EXPERIENCE, AND CULTURE

Thirteen Rotarians from RI District 5000, Hawaii, USA, participated in all the basic education improvement activities in Tanahu, Nepal, from December 10-15, 2023. Rotarians from District 5000 worked jointly with the respective schoolteachers in classroom teaching demonstration activities and laboratory set-up in Shree Jana Jukta Shai High School and Shree Uday Secondary School. Laboratory set-up activities included mainly the following: 1) Lab safety measures - handling equipment and chemicals, eye and body wash, first-aid, emergency exit, 2) Placement of laboratory equipment and tools, charts and figures, 3) Labelling chemical and laboratory tools and equipment storage cabinets, 4) Lab use by the students (working in a group), 5) Laboratory data collection and recording, and 6) Cleaning and the maintenance of the lab. They also participated in teacher's and adult science literacy trainings which were jointly organized by Asta-Ja Research and Development Center, Kathmandu, and Rotary Club Damauli, Tanahu, Nepal. As a part of agricultural activities, Rotarians from Hawaii visited mushroom farms, paddy fields, and other

areas and interacted with farmers with the help of Nepali interpreters. The first stop was at a mushroom farm which had an extremely interesting production process. They use local hay, which first had to be sterilized by steaming. It was then placed in bags stuffed with the hay, after which a starter mushroom was added. The key to the whole process was the type of greenhouse, which, instead of having glass, had burlap bags. The farmers had to control the temperature, so if it got too cold, they took off the bags so the sun could warm them to the correct temperature. If it got too hot, they would wet the burlap bags to bring the temp down. The next stop on the tour was a brick factory. We watched the process of using local clay mixed with a fine grey substance to make the bricks. The people making these bricks were from the South and were incredibly skilled. They could make 1,000 bricks per day by hand. They

would then dry the hand-made bricks in the sun before firing them in the kiln. The kiln was also made of bricks. Dung is an important ingredient in fertilizer, creating local plaster and making fire. There were tractors available that could be rented by farmers who could afford i, to plow their fields. This would make the process of preparing the rice paddy less laborious. The final part of this trip was to go up a rather steep hill to where the farm workers lived. This was interesting because it showed that every little piece of land around the homes was being used; either to house their animals, grow vegetables, or local spices. One of the animals at the farmer's home was a little piglet. On the way down the hill, we saw a piggery where a farmer raised pigs for meat.

The cultural exchange was fantastic and memorable. While local performers showed their local dances, Rotarians from Hawaii performed Hula dances. Local performers showed *bhajan, kaura, kumal*, and *darai* dances. It was amazing that the Rotarians from Hawaii mingled so well with local cultures and participated in the dances. The Rotarians from Hawaii thoroughly enjoyed evening festivities, including food, costumes, and dances.

II. Lessons Learned and Future Recommendation

Lessons learned from this study are listed below:

1) School administration has realized the gap between current education and problem-solving skills and is willing to develop laboratories to fill this gap. Technical curricula such as veterinary science, agriculture, and survey and engineering are in great need of laboratories for delivering basic and applied science and engineering education for the development of students' skills and practical application of science and engineering in problem-solving. Because the education system is largely theoretical without sufficient hands-on laboratory and field skills, graduates from the current curriculum lack the necessary technical skills and knowledge which is critical for agriculture, environment, and climate change adaptation.
2) It would have been much better if schoolteachers from both High Schools were trained in laboratory setup, E-Learning, classroom teaching demonstration, and teacher's and adult science literacy training prior to implementing these activities in full scale. It would have been more effective if the schoolteachers created classes for teaching demonstrations that were pertinent to the age group and subject matter they were teaching. Schoolteachers need training on the use of laboratory equipment and field skills for problem-solving. They should be able to manage and utilize any new laboratory that supports practical teaching and learning. We noticed that there's a need for teachers to train classes in e-learning before the students can hope to learn from instruction. It is necessary to have a strong internet connection for eLearning. Also, teachers should be capable of teaching eLearning and any troubleshooting on computers. There are several Nepalese e-learning classes online that students could follow.
3) Students also are not clear about their future careers and are not sure how the science and technologies that they learn in the classroom can help them get jobs or developing their own careers in the future. It was noticed that that not too many students could vocalize what they were passionate about or what they wanted to achieve in and after school. The most common one for the boys was joining the military. Only a few said they wanted to follow a specific path, i.e. teachers, a veterinarian, doctor or nurse. It was also noticed that most female students drop out before graduating high school, which is very sad. They all seemed so eager to learn. It is necessary to make future career options clear to student bodies. We also noticed that students didn't have computer lessons or access to the school computers after 7th grade, so it is hard to imagine how they are expected to do e-learning classes. If they are not able to use the computers at school, perhaps they should be allowed to bring their smartphones to use during e-learning sessions.
4) Local communities are very willing to learn and they are trying to find ways for their income generation and resource conservation. Because of a lack of formal education, local communities are lagging behind in understanding the current challenges in relation to agriculture, environment, and climate change.

For basic education improvement in Nepal, we recommend the following:

1) We recommend scaling basic education improvement activities to cover the whole Gandaki Province and even other regions of the country. For this, the target High Schools should primarily be the CTEVT program schools. It may have to be at different phases.
2) In scaling up, attention has to be given to each basic education improvement activity, including laboratory development, eLearning facility, teacher's training, classroom teaching demonstration, and adult science literacy.
3) Need-based strategic laboratory development is necessary. Prioritization of the equipment and laboratory supplies and focusing on the most critical equipment, appliances, and supplies will reduce the time and cost of laboratory development. More importantly, it might be a better approach to developing a list of supplies based on the number of students and the lab space that is available. Risk of the development of a crowded lab exists.
4) It is recommended that training should be conducted for running laboratories and eLearning facilities for the teachers and staff of respective schools. In the absence of good training on these facilities, it is difficult to find dedicated teachers and staff in running or troubleshooting these facilities.
5) While knowing the project by teachers and staff is absolutely necessary, it is also necessary to have knowledge of basic education improvement projects among the students. Students should be aware of what is going on in the school. A community should also have an orientation about the upcoming activities and should clearly link with the basic education improvement in the

local area and schools that will benefit schoolchildren and local community members.

6) Manuals for the teachers and adult science literacy training should reflect the local issues and concerns and must be as simple as possible for communication.
7) Shree Jana Jukta and Shree Uday High Schools have been using their facilities and skills to train other schoolteachers in the region. This is a clear indication of the usefulness of the project activities.

III. Summary and Conclusion

Basic education improvement by developing school infrastructures such as science and engineering laboratories and training teachers to support student learning is an urgent need, especially for High Schools that offer technical and vocational diplomas in Nepal. Direct and active involvement of schoolteachers in setting up school facilities such as science laboratories, E-Learning centers, classroom facilities, and school furniture will make the basic education improvement program more effective. It is necessary to train schoolteachers in basic and applied science laboratory skills and E-learning, especially in technical and vocational certificate programs. Major activities necessary for basic education improvement include developing science and engineering laboratories, E-Learning facilities, teacher's training, interactive classroom teaching, and raising adult science literacy in the communities. Career-focused technical education is the most effective way to reduce gender-based and caste-based disparity in underprivileged communities and schools. Improvement of school infrastructures and training schoolteachers in laboratory skills and application of science in problem-solving will ultimately enhance student's learning and skills development. Production of skilled graduates in problem-solving will contribute to rebuilding Nepal from earthquake disaster, coping with the impacts of COVID-19 pandemic, increasing agricultural production, improving infrastructure, generating household incomes for local communities, and overall economic development of Nepal. Local communities will also benefit from increased student enrollment and having laboratory facilities in the community for testing samples related to agriculture, livestock, water resources. In addition, laboratory improvements will benefit the whole student body in a school as they get opportunities to work in improved laboratory facilities. Widespread scaling up of basic education improvement programs at the Provincial and regional level or the whole nation is suggested.

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