GPE KIX EAP HUB

KNOWLEDGE INNOVATION EXCHANGE

SYNTHESIS NOTE OF KIX EAP LEARNING CYCLE 2
EQUITABLE ACCESS TO EDUCATION WITH GEOSPATIAL DATA

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GPE Transforming Education

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Network for international policies and cooperation in education and training
Réseau sur les politiques et la coopération internationales en éducation et en formation

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INSTITUT DE HAUTES ÉTUDES INTERNATIONALES ET DU DÉVELOPPEMENT
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ABOUT NORRAG

NORRAG is a global membership-based network of international policies and cooperation in education and training. In 1977 the Research Review and Advisory Group (RRAG) was established, which then founded several regional RRAGs, one of which became NORRAG in 1986. NORRAG's core mandate and strength are to produce, disseminate and broker critical knowledge and to build capacity for and with academia, governments, NGOs, international organizations, foundations and the private sector who inform and shape education policies and practice, at national and international levels. By doing so, NORRAG contributes to creating the conditions for more participatory, evidence-informed decisions that improve equal access to and quality of education and training.

NORRAG is an associate programme of the Graduate Institute of International and Development Studies, Geneva. More information about NORRAG, including its scope of work and thematic areas, is available at www.norrag.org

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ABOUT THE KIX EAP HUB

The Global Partnership for Education (GPE) Knowledge and Innovation Exchange (KIX) is a joint endeavour with the International Development Research Centre (IDRC) to connect expertise, innovation, and knowledge to help GPE partner countries build stronger education systems and accelerate progress toward SDG 4. There are globally four KIX hubs or Regional Learning Partners, overseen by IDRC. The hub functions as a regional forum within KIX. NORRAG (Network for International Policies and Cooperation in Education and Training) is the Regional Learning Partner for the KIX Europe Asia Pacific (EAP) hub.

The KIX EAP hub facilitates cross-country knowledge and innovation exchange and mobilisation, learning, synthesis, and collaboration among national education stakeholders in 21 GPE partner countries in the EAP region.. The hub also offers opportunities for peer learning and exchange by means of professional development and inter-country visits.

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ABOUT THE KIX EAP LEARNING CYCLES

The KIX EAP Learning Cycles are professional development courses offered to national education experts from 21 GPE partner countries in the Europe | Asia | Pacific (EAP) region. Teams of national experts analyse, contextualise, and produce new knowledge on policy analysis and innovations. These professional development courses allow participants to share experiences, exchange knowledge, and contribute to the strengthening of their national education systems. The learning cycles are also an opportunity for national experts to publish their studies and findings internationally, and disseminate them on diverse online platforms, with support from the KIX EAP hub.

ABOUT THE LEARNING CYCLE ON EQUITABLE ACCESS TO EDUCATION WITH GEOSPATIAL DATA

This case study is a result of the KIX EAP Learning Cycle "Equitable access to education with geospatial data". Organised by NORRAG and the UNESCO International Institute for Educational Planning (IIEP), this professional development course ran from 15 June to 16 July 2021. Across 5 weeks, this Learning Cycle enabled participants to apply basic mapping techniques on a geographic information system (QGIS), understand the geospatial dimension of educational planning and management, and challenge the different aspects of equitable access to education by harnessing the power of geospatial data in their daily work. 10 national teams from Afghanistan, Bangladesh, Bhutan, Cambodia, Kyrgyz Republic, Maldives, Moldova, Pakistan, Papua New Guinea, and Sudan took part in this Learning Cycle.

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A BIOGRAPHICAL NOTE ON THE AUTHORS

Arushi Terway is an international education policy specialist and has extensive experience in comparative policy analysis. She has conducted comparative research on various global education issues like teacher policy, decentralization, education finance, secondary education, and non-state education provision. She serves as the Private Sector Approaches thematic lead at NORRAG and a Technical Advisor for the KIX EAP Hub. She has consulted for numerous international institutions including the Global Partnership for Education, Open Society Foundation, Results for Development Institute and FHI 360. She has an EdD from Teachers College, Columbia University in International Education Development, EdM from Harvard Graduate School of Education and an MA in Political Science from the Australian National University.

Nemhoilhing Kipgen holds a Master's Degree in International Development Studies from the Graduate Institute (IHEID) Geneva, Switzerland. As a Graduate Research Assistant for the KIX EAP Hub, she supported the overall objective of KIX to mobilize, produce and disseminate knowledge with a focus on amplifying voices and enhancing the visibility of education experts from the Global South. Previously, she worked as a Youth Development specialist with United States Peace Corps in Thailand. Her research interest lies in the humanitarian-development nexus, youth, peace, and security.

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LIST OF ACRONYMS AND ABBREVIATIONS

CR	Completion rates
GER	Gross Enrolment Rate
GIS	Geographic Information System
GPI	Gender Parity Index
KIX EAP	Knowledge Innovation Exchange Europe, Asia, Pacific Hub
ROSC	Reaching Out of School Children
UNESCO-IIEP	UNESCO International Institute for Educational Planning

LEARNING CYCLE: EQUITABLE ACCESS TO EDUCATION WITH GEOSPATIAL DATA

NORRAG and the UNESCO International Institute for Educational Planning (IIEP) organised the KIX EAP Learning Cycle on the Equitable Access to Education with Geospatial Data course, which ran from 15 June to 16 July 2021. Across 5 weeks, this professional development course enabled participants to apply basic mapping techniques using QGIS, a geographic information system (GIS). This course was aimed at understanding the geospatial dimensions of education planning and management, with a specific focus on equitable access to education. National experts from 21 countries in Europe, Asia, and the Pacific (the EAP region) were eligible for the course. After reviewing applications from national expert teams, national teams from 10 countries – Afghanistan, Bangladesh, Bhutan, Cambodia, Kyrgyz Republic, Maldives, Moldova, Pakistan, Papua New Guinea, and Sudan – were selected to participate in this learning cycle. Over 70% of the participants were government officials from KIX EAP countries.

The learning cycle's overall objectives were as follows:

- To understand the geospatial dimension of educational planning and management;
- To apply basic mapping techniques to visualise key education statistics;
- To combine different sources of information and analyse the results in light of geographic disparities;
- To examine and contrast different policy options that might respond to challenges in equitable access to education, particularly policies on gender equality; and
- To produce high-quality knowledge products that are published in English to be widely disseminated by the KIX EAP hub.

Specifically, this course was designed to enable participating planners to challenge the different aspects of equitable access to education by harnessing the power of geospatial data in their daily work. For example, geospatial data could reveal that a particular group of school-age children is at a disadvantage that prevents them from fully participating in the learning process because they are off the electrical grid and find it challenging to study at home. Out of 10 national teams, eight teams (Bangladesh, Bhutan, Cambodia, Kyrgyz Republic, Maldives, Moldova, Papua New Guinea, and Sudan) produced knowledge products in the form of country case studies examining the geospatial data and analysis of education equity challenges.

CASE STUDY FINDINGS

Each country's knowledge product followed the outline provided by the course instructors from UNESCO-IIEP. This outline includes five key sections:

1) Definition of equity in the country context;
2) School map for an educational level;
3) Discussion of factors affecting the demand for education;
4) Examination of the equitable supply of education; and
5) Recommendations for policy responses to achieve more equitable access.

The following sections provide the overall and unique findings of the national expert teams in each country, followed by common learnings across countries.

Bangladesh

The country team experts in Bangladesh developed a case study titled "Micro-planning by Using Geospatial Data to Achieve Quality and Equitable Primary Education in Bangladesh With a Special Focus on the Floating Population in Dhaka Metropolitan City." The team identified that Bangladesh had made considerable progress in achieving the Millennium Development Goals, especially high access to primary education. However, challenges exist in reaching vulnerable populations, such as children in urban slums and populations living in "floating" communities on water.

The Government of Bangladesh has implemented the Reaching Out of School Children (ROSC) Project Phases I and II to target vulnerable children. The national expert team suggested that, compared to national or macro-level planning, micro-planning with geospatial data could help the government identify local conditions, constraints, and solutions more effectively when targeting the remaining out-of-school children. The team utilised QGIS, an open-source GIS application, to map out the school locations and high-density population areas in Dhaka's metropolitan region. The mapping revealed that a large proportion of the schools were located further than a 15 to 30-minute walk from the populated areas, which could hinder many children's access to schools.
The team also recognised that data accuracy must be improved to utilise geospatial data for micro-level policy planning in Bangladesh. Therefore, the government should consider developing more specific datasets and providing education officers with more training in preparing and using GIS maps.

Bhutan

The Bhutan team proposed that education planning using geospatial data could improve access to education for the student populations that are most difficult to reach. Bhutan has achieved a primary net enrolment rate of 99.7%. However, challenges remain in providing inclusive education and improving the quality of education for all.

The team used QGIS mapping to identify a few potential barriers to consistent access to primary schools. They pinpointed schools in specific sub-districts that are not connected to the road network and are therefore difficult to access. It also managed to identify the 5-km catchment areas for schools and mapped them alongside the population data for the school-age population to understand the accessibility and efficiency levels of school locations. Furthermore, the team combined the data on school location and flood risk areas to identify schools prone to flood risk, which could support improved school disaster management.

Through this exercise, the team agreed that geospatial data in education planning could support improved resource allocation and progress tracking and ultimately ensure equitable and high-quality education for our learners. Its members recommended that the Government of Bhutan take the learning from the course further and make better use of isochronous methods that consider rivers, landscape, and road availability to effectively measure accessibility.

Cambodia

The national expert team in Cambodia identified that despite considerable progress in increasing the lower-secondary enrolment rate over the past few years (39% in 2015 to 57.4% in 2020), the gender parity index (GPI) for the gross enrolment

rate (GER) has risen from 1.14 in 2016 to 1.21 in 2020, putting boys at a disadvantage. The completion rates (CR) in 2020 were 50.3% for girls and 40.2% for boys.

The team used QGIS mapping to evaluate disparity between districts in terms of the following indicators at the lower secondary level: gender parity for gross enrolment rate, completion rate, promotion rate, repetition rate, and dropout rate; location of schools in different geographical terrains; pupil-to-teacher ratio; and percentage of qualified teachers. Using this mapping exercise, the team made two specific policy recommendations: (1) constructing institutions in each commune so that students have access within 20 km of their homes and (2) ensuring proper teacher training in districts with lower proportions of qualified teachers.

Kyrgyz Republic

In their knowledge product, the Kyrgyz Republic team evaluated regional disparities and patterns by examining the following: (1) school distribution by form of government (state, municipal, private, and mixed) at the regional level; (2) distribution of pre-primary children and schools by number of shifts at the lowest administrative level; (3) pupil–teacher ratio at the regional, district, and lowest administrative levels; and (4) distribution of teachers by teaching experience at the district level.

The geospatial mapping of various indicators helped the team highlight several of the country's educational challenges, such as overcrowding in urban areas due to internal migration, a high number of shifts in schools, the lack of appropriate/safe buildings, the anticipated increase in birth rate, the lack of schools in certain areas, and transportation barriers in border territories.

In this exercise, the team recommended that the government use geospatial data to effectively implement the national education plan's priorities. Specifically, it recommended incorporation of better data at the *aimags*[1] level to allow management bodies to visualise and justify their decisions and compare indicators among *aimags*, districts, and regions. The use of geospatial data would make it possible to study factors relating to the inclusive socialisation of children in education.

Maldives

Maldives has been successful in reaching the Millennium Development Goals and is well on its way to achieving Sustainable Development Goal 4. Although the government's efforts to provide equal education opportunities for all children have brought about great success, challenges in equity and access to higher secondary education remain. Maldives' national experts examined the challenge of accessing higher secondary education.

The geospatial mapping exercise revealed that higher secondary grades are not available in all these island schools; students who wish to participate in higher secondary education would have to relocate to nearby islands or travel daily from one island to another. For school placements, Maldives ensures that every atoll (sub-administrative level) has a higher secondary school. Not every island that provides lower secondary education also provides higher secondary education. Therefore, students who complete lower secondary education on islands without higher secondary schools face issues in achieving equitable access to higher secondary education.

The team recommended the use of geospatial data to improve policy planning to address equity across all islands. For example, the government currently ensures that higher secondary schools are available to enrol 10 or more students per grade; however, this approach provides low-level access to many students living on islands scattered around the nation.

Papua New Guinea

In their knowledge product, the Papua New Guinea team examined secondary schools' locations in terms of population density and their accessibility via roads and rivers. Given that Papua New Guinea has little data on geospatial variables corresponding to the education system, the team recommended that the government improve data provision. The team posited that to ensure adequate resource allocation to all children in the country, the government could use geospatial data to improve micro-level planning.

Sudan

In Sudan's context, the case study identified challenges in the education sector including regional disparities (between urban and rural areas), gender differences, and school density. Geospatial mapping revealed that most schools are concentrated in urban areas, which reflects the unequal distribution of schools between rural and urban areas. Another difference the team found was that rural and remote areas had the most co-ed schools, whereas schools in urban areas were separated according to gender. Although, culturally, society may expect to send boys and girls to separate schools, this disparity could indicate a lack of infrastructure. As expected, schools with high enrolment rates were located in high-population-density regions.

Moldova

The team identified the challenge of providing equitable quality education services to different ethnic groups in the country. The Moldova team generated a school map based on the language of instruction used in general education: Russian, Romanian, or both. The team found that the distribution of schools based on instruction language is associated with the ethnic populations

1 Aimags are the smallest geographical unit, comprising 1–20 villages and settlements.

living in each region. Urban areas have schools with Russian as the language of instruction and schools with Romanian as the language of instruction. However, in regions with large populations of ethnic minority groups, most schools provide Russian as the language of instruction. Students in these areas study in languages other than their mother tongue and the culture and traditions of their people.

The team recommended using geospatial data for education planning in Moldova to respond to the country's changing student populations. Analysing the type of institutions, language of instruction, road infrastructure, and geographical specificity (in Moldova, winters bring substantial snow, and sometimes road sections become impassable), a map can aid in making appropriate decisions regarding the formation of the network of educational institutions to ensure equity.

LESSONS ACROSS COUNTRY CASE STUDIES

The geospatial data mapping of education indicators and geographical factors analysis provided a useful tool to the country representatives in understanding equity challenges in schooling's supply and demand. Although each country has unique equity challenges that can be identified through the available data, specific issues appear to be common across countries.

An essential challenge that can be identified through geospatial mapping is specific populations' *geographic vulnerability*. Several country teams highlighted their countries' unique geographical challenges as barriers to many children's education access: Bhutan, Maldives, Bangladesh, and Moldova. In Bhutan, the team used geospatial data to map which schools are at risk of flood. In Maldives, not all islands have higher secondary schools, so students who want to attend higher secondary schools must either migrate to islands with schools or reside in nearby islands and regularly travel by sea, which is not only costly but also risky, given the region's unpredictable weather conditions. In Bangladesh, vulnerable and marginalised groups (*floating people*) residing in Dhaka metropolitan city cannot access education because of social factors and geographic challenges. In Moldova, the study revealed that roads can be dangerous and impassable during winter, making schooling or commuting to school hazardous.

Regional disparities between urban and rural areas were a common theme raised in the contexts of Bangladesh, Cambodia, the Kyrgyz Republic, Sudan, and Moldova. In Bangladesh, vulnerable groups are concentrated in urban slum areas, so micro-level geospatial analysis in these specific areas could be a highly effective policy planning tool. The study from Cambodia identified regional disparities in boys' and girls' completion rates. This indicated that there were regions (such as Ratanakiri province) where boys completed lower secondary education in higher numbers than girls did. This was a significant finding because in other parts of Cambodia, the opposite was true. The study in the Kyrgyz Republic revealed regional disparities in the distribution of experienced teachers; some regions are predominantly served by highly experienced teachers, whereas others have high proportions of inexperienced teachers. In Sudan, there are regional disparities in the distribution of mixed schools (boys and girls) because they are primarily located in rural areas. In Moldova, regional disparities were observed in the distribution of schools based on the language of instruction, with regions with high populations of ethnic minorities having access to predominantly Russian schools.

Although *internal migration* patterns were not apparent in the school mapping exercise, some countries identified them as significant challenges associated with access to education. In the Kyrgyz Republic study, one of the challenges was the overcrowding of schools in urban areas due to internal migration. In the Maldives, there was an increasing migration towards the Greater Malé to access higher secondary education. In Sudan, because of the growing populations of refugees and internally displaced persons, internal migration is an essential factor that policymakers and planners must consider to achieve effective educational planning.

CONCLUSION

Geospatial data and school mapping proved to be valuable activities for the national experts who participated in this course. These experts identified challenges with ensuring education equity in their countries that are usually not identified with the available education sector data alone. All teams' knowledge products were recommended using this data for improved education policy and with the intent of ensuring equitable access to high-quality education for all children. However, most teams also recognised the need to improve data availability and quality. They also recommended that country experts undergo more capacity strengthening in both analysis and geospatial data for better education sector planning.

APPENDIX

LIST OF PARTICIPANTS AND THEIR INSTITUTIONAL AFFILIATIONS

Country	Participants	Gender	Institutional affiliation
Bangladesh	U S Rokeya Akhter	Female	Research/academia
	Rokshana Akhter	Female	Research/academia
	Rokshana Perveen	Female	Government
	Farzana Abedin	Female	Civil society
	Jewel Rana	Female	Research/academia
	Arup Barua	Male	Research/academia
Bhutan	Tshelthrim Dorji	Male	Government
	Sherab Tenzin	Male	Government
	Sangay Yangchen	Female	Government
	Tshewang Dorji	Male	Government
	Dochu	Male	Government
Cambodia	Sivutha Onn	Male	Government
	Chan Sophon	Male	Government
	Vira Khlok	Male	Government
	Neth Sorphorn	Male	Government
	Sieng Virak	Male	Government
	Sokhon Nuom	Male	International organisation
Kyrgyz Republic	Masuma Bashirova	Female	Civil society
	Tilek Mukambetov	Male	Private sector
	Farida Ryskulueva	Female	Research/academia
	Ramil Yarmukhamedov	Male	Government
	Boiko Evgenia	Female	Government
Maldives	Moosa Adam	Male	Government
	Aishath Neena	Female	Government
	Dr. Aminath Shafiya Adam	Female	Research/academia
	Ibrahim Asif Rasheed	Male	Government
	Dr. Ahmed Mohamed	Male	Research/academia
Papua New Guinea (PNG)	Mr. Bernard Miki	Male	Government

Sudan	Daliayousif	Female	Government
	Sami Mohammed Ahmed	Male	Government
	Elmalieh Elmalieh	Male	Government
	Neamat Ali	Female	Government
	Monaalgam	Female	Government
Moldova	Victoria Musienco	Female	Government
	Corneliu Ciorici	Male	Government
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