



USAGE-NG

Up-skilling Agricultural Engineering
Next Generation

GIS Workshops at Turkana University College (Kenya)

Work Package n°: **4**

Activity n°: 4.5

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1 Introduction

Project Context: The Erasmus+ USAGE-NG project (“Upscaling Agricultural Engineering for Next-Gen”) focuses on empowering smallholder farmers through digital technologies, modular education (micro-credentials), and lifelong learning (LLL) opportunities. A core aim is to extend smart farming knowledge and skills to diverse learners – including higher education students and lifelong learners – in innovative formats such as mobile learning and micro-credential courses. While the project’s primary activities occur in Europe, its dissemination plan also targets global contexts, recognizing that small-scale farmers and learners in developing regions face acute challenges in climate adaptation and digital skill gaps. In line with this, Activity 4.5 was designed to extend USAGE-NG’s impact to a resource-constrained, rural context by leveraging BOKU’s LLL expertise in Turkana County, Kenya.

Course for Europe and Beyond – Piloting in collaboration with Turkana University College (TUC): How was the trip for the course in Turkana financed: Through a parallel initiative called WEEK (“Women LLL Education and Empowerment in Kenya”) exclusively covering travel expenses to Africa, BOKU partnered with Turkana University College (TUC). The WEEK project (2024–2026), funded by AfricaUniNet, shares synergies with USAGE-NG: it aims to design a LLL concept for TUC, identify local educational needs (especially of women), and pilot digital skills training. A driving goal is to empower under-served populations (particularly women) by improving access to education, thereby promoting socio-economic inclusion in Turkana. Activity 4.5 leveraged these synergies, with BOKU’s Department for Lifelong Learning organizing two workshops (study visits) in Turkana. These workshops served both as capacity-building exercises for TUC and its community and as field research to inform USAGE-NG’s outputs (e.g. a report on smallholder learning needs in developing countries).

1.1 Report Objective

This report documents the two BOKU-hosted workshops in Turkana – culminating in the second study visit to TUC on 22–29 September 2025 – and presents their outcomes. We detail the participants and agenda of the training visit, and the train-the-trainer GIS course delivered. Key findings on institutional interest, skills gaps, infrastructure barriers, and learner motivations are discussed. Throughout, we contextualize the role of GIS education in development, and strategies for implementing micro-credentials and mobile learning in African higher education. Recommendations and planned follow-ups an advanced GIS course are also provided.

1.2 Workshop and Training

The training and the workshop – a week-long study visit at Turkana University College – operationalized the partners. This training facilitated, a train-the-trainer course in Geographic Information Systems (GIS). The delegation from BOKU (Prof. Thomas Bauer and Vladana Vidric) worked closely with TUC’s team (led by Dr. Fredrick Kassilly, TUC’s coordinator for the LLL initiative) throughout the visit.

1.2.1 Participation and Agenda

BOKU Delegation: Prof. Bauer (an expert in agricultural engineering and digital farming) and Ms. Vidric (LLL project manager) represented BOKU. Their combined expertise – agriculture technology and adult education – reflected the dual focus of the visit: introducing digital learning tools (GIS in this case) and developing the institutional framework for lifelong learning. They brought training materials (GIS software, laptops, manuals) and methodology for strategic planning (SWOT templates, questionnaires).

Local Participants: On TUC's side, participants included the Principal and academic deans of TUC, faculty members from departments of agriculture and continuing education, and administrators interested in LLL. Importantly, representatives from the Turkana County Directorate of Adult Learning & Education and facilitators from community organizations (e.g. the Canaan Full Gospel Church's adult literacy program) joined for parts of the visit. A cohort of ~10 prospective trainers (TUC staff and local NGO educators) were enrolled for the GIS training component. Additionally, about 25 adult learners (mostly women from nearby communities) interacted during the community engagement sessions.

1.2.2 Schedule: The study visit spanned eight days. The training focused on the GIS train-the-trainer course, including practical field mapping exercises. Train-the-Trainer Course on GIS (Geographic Information Systems)

The five-day train-the-trainer course in GIS was delivered by Dr. Bauer with assistance from Ms. Vidric. This course exemplified USAGE-NG's objective of transferring digital agriculture and geospatial skills to new contexts. Its purpose was twofold: (a) to build local capacity by training TUC staff and community educators who can in turn teach others (multiplier effect), and (b) to pilot the implementation of a micro-credential style short course in a low-resource setting, drawing lessons for future courses.

Course Design: The GIS curriculum was tailored to local needs (geodata relevant to rural livelihoods) and constraints (limited computers and intermittent power). BOKU provided *six laptop computers* pre-loaded with QGIS (an open-source GIS software) and offline datasets (e.g. base maps of Turkana, sample agricultural and climate data). Using open-source tools was strategic – it avoids licensing costs and aligns with literature suggesting that adopting free GIS software plus training can significantly empower local organizations in low-income settings. The course modules included: basic mapping concepts, GPS data collection (trainees learned to use handheld GPS units/smartphones to mark waypoints), introduction to QGIS interface, creating and interpreting maps (with examples like mapping community water points, grazing areas, or literacy center locations), and simple spatial analysis (e.g. buffering villages by distance to a water source). (Martin 2011; IFAD 2024)

1.3 Delivery and Pedagogy

Recognizing the participants were themselves educators or extension officers, the instructors modeled adult learner-centered pedagogy. Each session combined brief lectures with hands-on practice and group problem-solving. For instance, after teaching how to input GPS coordinates, trainees went outside to map the TUC campus and a nearby market, then returned to plot these points in QGIS. This experiential approach kept participants engaged and illustrated how to teach GIS in a practical way. The training also incorporated discussions on how GIS could be applied in Turkana: participants brainstormed uses such as mapping rangeland resources, monitoring boreholes, planning education outreach (using maps to decide where to open new adult classes), etc. These discussions reinforced the relevance of GIS skills for local development, echoing global observations that GIS enhances planning, monitoring, and evaluation in rural projects. (Mabiso, Athur Mundy, Oliver Songsermsawas, Tisorn 2020)

Challenges and Adaptations: A few challenges arose. Power outages disrupted one afternoon session – the trainers responded by showing how to use paper maps and coordinate grids as a backup, emphasizing low-tech resilience. Some trainees were less computer-proficient; the instructors provided extra one-on-one tutoring in basic file management and found that peer learning emerged (the quicker learners helped others). The limited number of laptops meant participants often worked in pairs, which actually fostered collaboration. Despite these hurdles, all 10 trainees completed the course, each producing a simple map as a final assignment (e.g. one created a map of local adult education centers with population data overlay).

Outcomes: The train-the-trainer course was deemed a success on multiple levels. The trainees acquired new skills and confidence – many had never used GIS before, yet by the end could perform basic mapping. They expressed excitement about integrating these techniques into their work (one TUC lecturer planned to involve students in mapping community gardens). More broadly, this pilot demonstrated the viability of delivering a micro-credential-type course in a low-resource African setting. It highlighted the importance of scaffolding content and blending offline methods: for future offerings, even more emphasis on preparatory digital literacy and providing content in bite-sized, mobile-friendly formats is recommended. (This aligns with best practices in mobile learning, which stress designing lightweight, modular content accessible on basic devices). The positive feedback suggests that an advanced GIS course (perhaps focusing on more complex analysis or use of drones/satellite imagery) would be welcomed – indeed, planning for an advanced follow-up training became one of the agreed next steps. (Eduwik 2025)

Key Findings

By the conclusion of the study visit, the following key findings had emerged regarding the development of a Lifelong Learning Unit at TUC and the broader educational context in Turkana:

- **Skills Gaps – Need for Soft Skills and Digital Skills:** The needs assessment consistently highlighted that along with subject-specific knowledge (agriculture, business, etc.), learners require basic soft skills (communication, language, learning-to-learn) and digital skills. Many adults in Turkana have never used a computer or the internet; even some educators have limited ICT exposure. Thus, any advanced course (like GIS or agribusiness) must be preceded by or integrated with digital literacy training. The GIS pilot confirmed this – time had to be devoted to fundamental computer operations for some trainees. This finding aligns with broader development literature that emphasizes digital skills as a prerequisite for effective participation in today’s knowledge economy, and it justifies USAGE-NG’s emphasis on mobile learning and micro-credentials to build such skills. Soft skills (such as English language proficiency or basic math) are equally critical; participants noted that without these, learners struggle to progress or convert knowledge into practice. (ACQF 2025)
- **Infrastructure and Resource Challenges:** The implementation environment in Turkana is resource-constrained. Critical shortfalls include: ICT infrastructure (limited internet connectivity, few devices, unreliable electricity), learning facilities (most adult learning takes place in borrowed spaces like churches under difficult conditions), and human resources (few trained adult educators, heavy reliance on volunteers). These challenges are not unique to Turkana – rural areas across Africa face such constraints in delivering education. Overcoming them will require creative solutions: utilizing mobile technology for content delivery (since mobile phone coverage is better than road infrastructure), developing offline and low-bandwidth teaching materials, and seeking funding for basics like solar projectors or textbooks. Additionally, multi-stakeholder partnerships (with government, NGOs, and international donors) will be necessary to bolster the resource base of the LLL Unit. The study visit team specifically identified potential support from the county government (which could provide venues or stipend community educators) and international programs (e.g. the Commonwealth of Learning’s Lifelong Learning for Farmers initiative in Kenya, which could provide guidance or content). (Eduwik 2025)
- **Learner Motivations and Social Context:** The motivations driving adult learners – especially women – in Turkana are primarily practical. This confirms that LLL programs should be purpose-driven and relevant to learners’ lives. Courses that impart immediately usable skills (for instance, financial literacy for market traders, smartphone

use for accessing agricultural advisories, or basic GIS mapping to advocate for community resources) will likely see strong uptake.

These findings provide a nuanced understanding of what it will take to successfully launch and sustain for the rural African context. They will inform both the design of educational programs at TUC and the higher-level outcomes of USAGE-NG as it crafts guidelines for mobile learning and micro-credentials in such settings.

2 Follow-Up Actions Recommendations and sustainability

- **Advanced GIS Course (Train-the-Trainer II):** Given the success of the initial GIS training and expressed interest for more, an advanced GIS module is planned BOKU will secure additional datasets (e.g. satellite images of Turkana) and develop more case studies (such as mapping climate change impacts or land use changes). Where possible, the course will be blended with an online component to introduce participants to remote learning – a step toward sustainable delivery. This follow-up course is envisioned as part of a series that could eventually form a certified micro-credential in “Community GIS for Rural Development,” jointly issued by TUC and BOKU (an example of how micro-credentials can be implemented through international partnerships).
- **Monitoring and Evaluation:** It was agreed that progress should be closely monitored. BOKU will assist TUC in setting up a simple M&E system for the pilot courses – e.g. tracking the number of learners Conclusion

Activity 4.5 of the USAGE-NG project has demonstrated the tangible value of linking European higher education initiatives with on-the-ground capacity building in Africa. The workshop in Turkana yielded rich insights and immediate outcomes. We observed a community hungry for learning opportunities and an institution, TUC, ready to transform itself into a hub of lifelong learning despite many challenges. By conducting a thorough needs analysis and piloting a technical training in GIS, the project concretely illustrated both the possibilities and obstacles of implementing LLL in a rural, resource-limited context.

Academically, this activity reinforces key principles found in literature: that lifelong learning in rural/developing areas requires a holistic approach – one that integrates basic skills, leverages technology creatively to overcome barriers, and aligns with learners’ livelihoods and local knowledge systems.

For USAGE-NG, the outcomes of Activity 4.5 will enrich the project’s overall impact. The strategic roadmap for TUC’s LLL Unit, once finalized, can serve as a model for similar institutions in Africa interested in setting up lifelong learning programs. The data gathered on learner needs and feedback from the GIS pilot will feed into the project’s deliverables on mobile learning and micro-credentials, ensuring they address real conditions in low-income regions. Moreover, the human connections formed – BOKU and TUC staff, local facilitators and learners – lay the groundwork for continuous knowledge exchange beyond the life of the project. In the spirit of Erasmus+ and international cooperation, this activity has opened a channel for “South-North” learning as well: the innovation and resilience shown in Turkana (e.g. teaching under a tree with a chalkboard or using basic phones for quizzes) hold lessons for educators everywhere about accessibility and inclusion.

In conclusion, Activity 4.5 has been successful in both documenting needs and actively responding to them through pilot actions. It is recommended that USAGE-NG and its partners continue to nurture this collaboration. By doing so, the project not only disseminates its outputs but truly embodies them – creating an ecosystem of lifelong learning that bridges continents and empowers learners from European universities to the pastoral communities of Turkana. This is

a potent legacy for the project and a step toward making lifelong learning a reality for all, in line with global sustainable development goals. (ACQF 2025)

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