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P10 - ASTRO-KS Model: Building a Participatory Astronomy Learning Ecosystem for School and Rural Communities in Thailand.

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Astronomy can foster scientific literacy, critical thinking, imagination, and competencies essential for twenty-first-century learners. Nevertheless, many rural schools face barriers to high-quality astronomy education, including limited access to scientific instruments, specialist expertise, authentic data, learning resources, and hands-on scientific experiences. This study presents and evaluates the ASTRO-KS Model, a school-based framework developed at Khuruprachasan School in Chainat Province, Thailand, to build a participatory astronomy learning ecosystem under the guiding principle of "Astronomy for All". The model seeks to position rural schools as hubs for astronomy learning, student research, science communication, and community engagement.

The ASTRO-KS Model comprises seven interconnected and mutually reinforcing components: (1) Access and Awareness, expanding access to astronomy and strengthening public awareness; (2) School-Based Astronomy System, integrating astronomy into curricula, classroom instruction, extracurricular activities, and school management; (3) Talent and Team Development, strengthening the capacities of students, teachers, youth leaders, and implementation teams; (4) Research and Real Experience, engaging learners with astronomical observations, authentic data, scientific instruments, and research processes; (5) Outreach and Opportunity, communicating astronomy to the public and broadening learning opportunities for schools and communities; (6) Knowledge-Sharing Network, facilitating the exchange of knowledge, resources, and effective practices; and (7) Sustainability, establishing mechanisms for continuity, scaling, and long-term implementation.

A case-study programme evaluation was conducted using implementation data collected between 2023 and 2026. Data sources included activity records, participant registers, student research and innovation outputs, presentation records, network documentation, and participant evaluation surveys. The data were analysed using content analysis and descriptive statistics. The model systematically integrates classroom learning, a young scientists club, astronomy camps, student research projects, teacher professional development, student academic conferences, interschool collaboration, and public astronomy outreach.

The learning ecosystem expanded to seven secondary schools and fifteen primary schools across several provinces in Thailand, generating more than 12,000 cumulative participant engagements. Students developed more than 50 astronomy and STEM projects covering observational astronomy, astrophysics, spectroscopy, astronomy education, and integrated STEM learning. Student and teacher outputs were presented or recognised at national and international forums, including CAAS, TACs, K–12 Astro Asia, SEA-PEO, and national science and innovation events. Community outreach incorporated more than 50 hands-on learning activities, public sky observations, student-led science communication, and cultural performances. Among survey respondents, mean satisfaction was 4.72 out of 5.00, while the proportion of students expressing interest in further STEM study or careers rose from 58% in the pre-activity survey to 87% in the post-activity survey.

The findings suggest that the ASTRO-KS Model is a promising, practice-oriented framework for inclusive and participatory astronomy education. By connecting school-based learning, youth development, authentic research, public science communication, collaborative networks, and local culture, the model may be adapted and scaled in rural and resource-constrained settings to promote equitable access, strengthen school–community partnerships, and support sustainable astronomy learning ecosystems in Thailand and across Southeast Asia.

Keywords: ASTRO-KS Model, astronomy education, learning ecosystem, science communication, community engagement, educational equity, rural schools

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