

SEADSTEM PROJECT DESCRIPTION

The SEAMEO Regional Centre for STEM Education (SEAMEO STEM-ED) intends to collaborate with the Goethe-Institut and the SEAMEO Regional Centre for Educational Innovation and Technology (SEAMEO INNOTECH) to develop and disseminate effective learning materials for teachers in Southeast Asia. These materials will be shared on the Southeast Asian Digital STEM (SEADSTEM) online platform that has been developed by Goethe-Institut so that they are accessible to all teachers in the region. The project will offer a workshop for teachers interested in developing new learning units. The completed units will then be reviewed for quality and subsequently some of them will be field-tested to determine their effectiveness. Rigorous studies of how these learning units affect teaching practices and students' learning outcomes will be conducted. Then, the project will disseminate the most effective learning units on the SEADSTEM website. It is expected that SEADSTEM will become a popular learning portal for teachers who want to adopt STEM units in their schools.

BACKGROUND

The Southeast Asian countries are gradually making significant changes in their respective approaches to education, whether it is through the development of higher quality teaching personnel and more effective curricula or through incorporating new instructional techniques. Evaluations of academic performance, such as the Program for International Student Assessment (PISA), have persuaded the Southeast Asian countries to take action to improve their schools. Most notably, some ASEAN countries have advocated educational improvement as one of their national goals. STEM learning using high-quality learning materials is one of the strategies being used in the region to enhance critical thinking and problem-solving skills which are considered essential competencies for the workforce in the 21st Century.

As the development of STEM education in Southeast Asia moves forward, it is important to note how the context of teaching and learning differs from other regions such as the West. The effective delivery of STEM content relevant to local contexts is crucial for successful student engagement in the interdisciplinary learning approach of STEM. Thus, it makes sense for local academic experts to be involved in the development or the adoption of STEM learning resources for students in the region. The Southeast Asian nations share similar conditions and circumstances that allow learning materials to be transferred across regional borders, allowing for effective cooperation among the countries in the region in the development of learning materials.

The Goethe-Institut is the Federal Republic of Germany's cultural institute that is active worldwide. The Institute organizes many events and projects with local partners to foster cultural exchange and development in various areas, one of which is education. Notable projects of Goethe-Institut include the annual Science Film festival which brings together students from across the region to discuss scientific principles after viewing science films submitted from across the world. The Goethe-Institut started developing the SEADSTEM Platform in collaboration with SEAMEO INNOTECH and later formed a partnership with SEAMEO STEM-

ED in 2019, with the mission of providing a platform for Southeast Asian teachers to access high-quality STEM teaching resources. These resources are developed by Southeast Asian educators from Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Thailand, and Vietnam to ensure fidelity to the local context. Global experts working under the mutual mission of ensuring the quality of the materials are collaborating with Goethe-Institut. The partnership among the three institutions allows a vast network to be formed in the region, participation of appropriate experts on design and development, and field testing of the STEM learning resources and instructional routines developed in the region.

OBJECTIVES

The SEADSTEM project aims to provide an influential and reliable depository of tested STEM resources which will be accessible worldwide but focused on Southeast Asian educators. It is guided by the following objectives:

- To encourage the development and adoption of effective STEM resources in the Southeast Asian context by local educators;
- To train selected STEM educators as Master Trainers in order to provide support to other teachers with the implementation of the tested STEM resources;
- To support Master Trainers in sustaining this culture of developing, testing, and implementing STEM resources and to expand the platform's presence in the region;
- To create an international professional learning community of STEM educators who exchange evidence-based instructional and school improvement practices aimed at bettering student outcomes.

SCOPE OF THE PROJECT

The SEADSTEM project can be explained as a series of steps of development as follows:

1. Global STEM experts are assembled to lead/facilitate multiple capacity-building sessions for local educators. The first workshop will be led by Dr. Stuart Kohlhagen, founder of the Science Nomad and Director of Science and Learning of Questacon.
2. Notable STEM educators from ASEAN countries are selected through existing networks and recruited into the program. They will be encouraged to develop and submit learning units. Selection of the learning materials for testing will be based on a set of project standards proposed by SEAMEO STEM-ED.
3. STEM experts will lead expository, multiple-day workshops to initiate the process of developing new STEM resources according to international standards. The workshops will guide the selected educators to develop resources in the STEM subjects aligned with the SEAMEO Basic Education Standards (SEA-BES). The local educators will ensure the authenticity of the resources and their fit with the Southeast Asian context.

4. Teachers will try out those units in their classrooms with a lesson study process with their teacher peers and refine them as necessary. After the units are used in the real classroom settings, teachers will reflect on how the units could be revised to help teachers better respond to student learning. The subsequent changes might include improvements in the representation of the concepts, addressing student misconceptions, adjusting the scaffolding strategies, or refining the student materials.
5. A working group of regional researchers will be formed to design and implement a research plan using rigorous methods that satisfy the Centre's criteria in order to study the impact of the intervention on students' learning outcomes. The research will provide evidence of the program's effectiveness, and will assure educators that they can adopt the units with confidence.
6. Educators trained in the workshop will become "Master Trainers" for their respective areas and will be encouraged to conduct similar workshops in their localities that would stimulate further development of STEM resources followed by a cycle of evaluation before they are uploaded on to the SEADSTEM platform.
7. The virtual SEADSTEM platform will be eventually transformed to a dynamic professional learning community for educators to exchange high-impact practices and resources supported by evidence.

DELIVERABLES

The deliverables for the project will be:

1. The digital platform accessible to regional teachers and educators;
2. The development of learning units by regional educators;
3. The development of core trainers in Thailand and in the region;
4. Studies of the effectiveness of the developed learning units and their impact on student performance;
5. The adoption of the proven learning units by an increasing number of teachers

EXPECTED BENEFITS

The expected benefits should be:

1. An increase in the number of STEM teachers in the Southeast Asian region adopting proven learning resources with effective teaching strategies;
2. An increase in the number of proven STEM units available to teachers in the region;
3. A growing number of educators engaged in the professional learning community interacting and exchanging effective instructional practices and learning units supported by evidence;
4. In the long-run, improved outcomes in learner results in technology, mathematics, and science;
5. An increase in STEM-literate adults who make critical decisions, both privately and in careers for the betterment of society.

STAKEHOLDERS AND BENEFICIARIES

The initial beneficiaries will be teachers and students, but in the longer-term, parents and communities will also benefit from the improvements in STEM education which lead to the growth of the social and economic development contributed by the STEM-literate workforce.

PROJECT TIMELINE AND SOURCES OF FUNDS

The SEADSTEM platform will be continuously expanded by regional educators who have trained to develop learning resources that meet the quality standards set by the project. Additional tested learning resources will be added to the online depository over the next few years.

The SEADSTEM project is funded by the Goethe-Institut and partially by SEAMEO STEM-ED. The Australian Embassy of Bangkok will cover the cost of the expert (Mr. Stuart Kohlhagen) and his travel to conduct the first workshop. Additional funding will be sought from the Thailand International Cooperation Agency (TICA) to cover expenses for educators in the region during capacity building activities. Future funding sources will be explored to support the continuation of the project over the longer term.