



## **Project-based Learning (PBL) Course**

(7x 3-hour webinars, pre/post webinar tasks, plus follow-up support and feedback sessions)

### **Webinar Dates/time**

8 October, 15 October, 22 October, 29 October, 5 November, 12 November, and 19 November 2022 (support and feedback sessions will be finalized during the course).

All webinars will run 09.00 – 12.00 (Indochina Time - Bangkok).

### **Target Audience**

The course is for those involved in education (e.g., classroom teachers involved in teaching STEM subjects, administrators, university instructors, supervisors) in Southeast Asia wishing to, and able to engage students in STEM projects through Project-based Learning experiences.

We would like to work with teams of teachers from schools (ideally four teachers from each school) in all countries in Southeast Asia, who will work together as teams (Professional Learning Communities) on the course and in the development of their project-based learning experiences. University lecturers, education administrators, and supervisors interested in working with school teams are also welcome to join.

Each school involved in the course will receive a small bursary to support the running of the project in the school. A bursary of 30,000 baht will be provided to each country.

### **Introduction**

The SEAMEO STEM Education Centre is organizing a Southeast Asia STEM Fair and Expo which will take place on 10 March 2023. As part of the event, it is running a Southeast Asia STEM project competition for young people across the region. It is hoped the competition will involve more than 2,000 young people. The Competition will provide a platform for young learners from the member countries to compete in projects that demonstrate the application of STEM learning to solve the problems or challenges in their daily life or communities. Ideally, participating education institutions may form partnerships with university and private partners or community groups to volunteer their time in support of the learners. Through their mentorship, students will be inspired and encouraged to apply their STEM knowledge and practices to develop their own unique viable products or solutions to selected problems and submit projects to the competition. Learner groups who pass the national competitions and make it to the final round will present their work to the judging committee at the final competition.

This online workshop is designed to develop, advise, help, and support teachers to be able to engage their students in STEM projects through Project-based learning experiences (PBLs). Teachers will work in Professional Learning Communities through the programme of



webinars, pre and post webinar tasks, and as they develop and implement their project-based learning experiences.

## **Rationale**

SEAMEO STEM-ED is committed to supporting teachers across Southeast Asia to involve their students in authentic Project-based Learning experiences that engage them in solving real problem through real contexts. Through such learning experiences, in addition to applying and developing cross-disciplinary knowledge, students will develop multiple competencies and skills from working on these projects including critical thinking, creative thinking, problem solving, collaboration, communication, entrepreneurship, project management, leadership and community citizenship. Learner groups who pass the national competitions and make it to the final round will present their work to the judging committee at the final competition.

## **The online workshop approach**

The participants will be organized into online Professional Learning Communities (PLCs) from each school or country. The participants will work in Professional Learning Communities through the programme of webinars, pre and post webinar tasks, and as they develop and implement their project-based learning experiences.

The online workshop will involve participants in seven 3-hour webinars and carrying out pre and post webinar tasks in their PLCs. The webinars will involve PLCs in sharing the outcomes of the pre-webinar task; formal input from facilitator to draw out and extend the key learning; question and answer; and introduction to the post webinar task. The programme will progressively develop the participants' understanding of Project-based Learning (PBL). It will introduce good PBL practices through exemplar PBLs, video of classroom practice, and case studies; and involve participants in reviewing, discussing and reflecting on the practices.

The programme will also take the participants and their PLCs step-by-step through the process of developing an outline writing frame for their PBL and then developing their complete PBL. When they have developed their complete PBLs the school PLCs will plan implementation, support, team teach and observe during implementation, reflect together, and continue further develop the learning experience. During the development, planning and implementation phases, the course facilitators will have regular meetings with the PLCs to provide support, help, advice, and feedback.

When the student teams have completed their projects they will be entered for the SEA STEM Fair and Expo STEM Project Competition. Finalists will be invited to Bangkok to present their projects at the event on 10 March 2023.

## **About the online workshop**



The online workshop will develop the participants' understanding of STEM and STEM Education; Problem and Project-based Learning; the 4-stage Project-based Learning model; the purpose and expected learning outcomes of each stage; and the range of active, inquiry-based and design learning experiences and resources used to achieve the expected outcomes at each of the four stages depending on the problem, the subject/sector, and the nature of PBL. The importance of each stage and the four stages in providing the framework for PBL will be drawn out; and the scaffolds used to support the learners at each stage will also be introduced. The good practices adopted in implementing the model at each stage will also be emphasised. Participants will also be introduced to working as a PLC in the development, implementation and evaluation of their PBLs.

The participants will be introduced to a step-by-step approach to developing a PBL. Participants, working in PLCs, will develop an outline writing frame for their PBL and receive feedback, before modifying it and then developing the full PBL.

The participants will also develop their knowledge and understanding of good practices regarding the implementation of Project-based Learning through partnership and collaboration with universities, industry, and the community (the STEM Ecosystem) in developing, introducing, and mentoring projects.

Participants will also be introduced to strategies for preparing students for PBL and developing their PBL confidence and competence; planning PBL scaffolding; organising the classroom and learning environment; establishing and building student teams and developing employability skills; supporting student action planning, reviewing, and reflecting; communicating solutions, celebrating achievement and evaluation.

The facilitators will use learning materials adopted for different PBLs and different subjects and projects to introduce good practice with regard the application of active, inquiry and project-based learning; design, design thinking and engineering design; and also the self-study strategies adopted by well-developed and written four stage PBLs, including the use of study guides; activity sheets; frameworks and scaffolds to support the learning; and rubrics to enable self, and peer assessment. Through the examples the facilitators will also introduce the key role carefully constructed questions have in supporting the process. The facilitators will also introduce project management, target setting and monitoring tools; logbooks, reflection and review tools developed on various projects to support self-study and students self-management.

Finally, the participants will be introduced to a step-by-step approach to developing a PBL. Participants, working in PLCs, will develop an outline writing frame for their PBL and receive feedback, before modifying it and then developing the full PBL.

## Objectives

- The participants will have developed their knowledge and understanding of
  - STEM and STEM Education
  - Problem and Project-based Learning



- the four stages of the four-stage Project-based Learning model
  - the purpose and expected outcomes of each stage
  - the range of active and inquiry-based learning experiences and resources that can be used at each stage to achieve the expected outcomes
  - the application of scientific investigation in the PBL process
  - the application of design, design thinking and engineering design in the PBL process
  - how to develop highly motivating and inspiring Project-based Learning experiences
  - how to develop learning materials to effectively put each stage into practice
  - examples of Project-based Learning experiences developed for different subjects and in different countries.
- Participants will have developed knowledge and understanding of the organisation, processes, strategies and tools, involved in the following aspects of Project-based Learning (PBL) delivery
  - Preparing students for PBL and developing their PBL confidence and competence
  - Planning PBL scaffolding
  - Organising the classroom and learning environment
  - Establishing and building student teams and developing employability skills
  - Supporting student action planning, reviewing, and reflecting
  - Communicating solutions, celebrating achievement and evaluation.
- The participants will have developed their knowledge and understanding of good practices regarding the implementation of Project-based Learning involving employer and community engagement in developing authentic Project-based Learning.
- The participants will have understood the outcomes for the students and the lessons learned by teachers when implementing PBL.
- The participants will have worked in a Professional Learning Community.
- The participants will have developed a Project-based Learning experience.
- The participants will have implemented the PBL they develop with their students.
- The participants will have entered their students for the SEA STEM Fair and Expo STEM Project competition

## **Workshop programme**

*Webinar 1 (8 October 2022, 09.00 – 12.00):* Introduction to STEM, Project-based Learning and identifying a problem

*Webinar 2 (15 October 2022, 09.00 – 12.00):* Developing an understanding of the problem, developing the background knowledge, understanding, and skills to solve the problem

*Webinar 3 (22 October 2022, 09.00 – 12.00):* Applying Scientific Investigation within the Project-based Learning Process

*Webinar 4 (29 October 2022, 09.00 – 12.00):* Applying Design, Design Thinking and Engineering Design within the Project-based Learning Process



*Webinar 5 (5 November 2022, 09.00 – 12.00):* Involving universities, industry, and the community (STEM Ecosystem) in developing, introducing, and mentoring projects

*Webinar 6 (12 November 2022, 09.00 – 12.00):* Developing the complete STEM Project-based Learning experience

*Webinar 7 (19 November 2022, 09.00 – 12.00):* Preparing, managing, monitoring and mentoring students through the PBL experience

### **Certification**

On completion of all the following requirements, participants will be awarded with a SEAMEO STEM Education Centre certificate for the course:

- Attend all webinars and “participate” in webinar discussions.
- Complete all pre and post webinar tasks in the PLC.
- Work in a Professional Learning Community.
- Develop a STEM Project-based Learning experience applying the 4-stage PBL model.
- Implement the Project-based Learning experience.
- Enter all the student team projects for the SEA STEM Fair and Expo STEM Project Competition
- Share experience of developing and implementing the PBL experience as a PLC

### **Registration details**

Please refer to poster.

### **Contact details**

Please refer to poster.

### **Administrative Note**

Places on the courses will be limited to 5 school teams per country, plus administrators, university lecturers and supervisors who would like to work with school teams from their country. Places will be awarded on a first come, first serve basis.

### **The workshop facilitators**



### **Dr Mark Windale**

Until recently Mark held a senior academic post as Director, the Centre for Science Education, Sheffield Hallam University, UK. He is now a Senior Specialist at the SEAMEO STEM-ED Centre. Over the past 27 years Mark's work has included running national and international STEM Education programmes; the Professional Development of STEM teachers; STEM curriculum projects; development of STEM teaching and learning resources; Professional Development for school leaders in leading change; public engagement in STEM activities; and research. Mark played a central role in all 11 Action Programmes (APs) of the UK STEM programme; and was involved in running consultation and dissemination workshops for stakeholders and programme deliverers.

Over the past 25 years he has run national Science and STEM education projects, in partnership with the British Council, ministries of education and STEM companies in Thailand, Malaysia, Brunei, Philippines, Vietnam, China, Sri Lanka, India, Kazakhstan, Ecuador, Azerbaijan, Hong Kong and UAE. Mark has experience of working at a national policy making level, running regional, national, and international programmes to support ministries, education areas, schools, school leadership teams, departments, and teachers to effectively implement coherent and coordinated STEM programmes and STEM teaching and learning. National programmes he has run in Southeast Asia include the Inspiring Science (Thailand), IBSE Brunei and HEBAT Sains (Malaysia) Projects.



**Edward M. Reeve, PhD**



Professor Emeritus  
Technology & Engineering Education  
Utah State University

Dr. Edward M. Reeve is a **professor emeritus** and former teacher educator in **Technology and Engineering Education (TEE)** at **Utah State University (USU)**.

His current assignment is as a **Senior STEM-Ed Specialist** with the Southeast Asian Ministers of Education Organization (**SEAMEO**), STEM Education Center in Bangkok, Thailand (<https://seameo-stemed.org>).

In his career, he worked to advance knowledge in the fields of **Technology and Engineering Education**, and **Career and Technical Education (CTE)** which was formerly known as vocational education in the U.S. He has experience working with many conferences, including serving as the **conference chairperson** for the annual international conference sponsored by the International Technology and Engineering Educators Association (ITEEA).

He has experience as a secondary **education teacher**, and as a **university administrator** (i.e., interim vice provost), He is a recent **past president** of the ITEEA ([www.iteea.org](http://www.iteea.org)) and **past president** of the Council on Technology and Engineering Teacher Education (CTETE – [www.ctete.org](http://www.ctete.org)).

His professional interests, research, and numerous publications and presentations have been in areas related to educational standards, curriculum development in science, technology, engineering, and mathematics (STEM) education, competency-based education, and improving teaching and learning. He is also a former Fulbright Scholar and Fulbright Senior specialist.

## Appendix: Webinar programme

### Webinar 1: Introduction to STEM, Project-based Learning and identifying a problem

#### *Pre-webinar task*

- Part 1: Reviewing, discussing, and reflecting on exemplar Project-based Learning experiences (PBLs);
- Part 2: Identifying STEM in daily lives.

#### *Webinar*

- Introduction to the course, course structure, course requirements, working as a Professional Learning Community, support and feedback processes (MW)
- Sharing pre-webinar task outcomes (MW)
- Introduction to STEM, STEM Education, and STEM Careers (ER)



- Introduction to Problem-based Learning and Project-based Learning (ER)
- Q&A (ER)
- The 4-stage Project-based Learning Model (MW)
- Developing a PBL Step 1: Identifying a problem and context for a project
- Q&A (MW)
- Working as a Professional Learning Community (MW)
- Introduction to the Post-webinar task (MW)
- Q&A (EV, MW)

#### *Post-webinar-task*

- Part 1: Reviewing, discussing, and reflecting on exemplar Project-based Learning experiences (PBLs) – how do they introduce the problem and context?
- Part 2: Developing the outline PBL Stage 1: Identify a problem for your project. How will you introduce the Problem and context?
- Part 3: Develop STEM pictures/video.

### **Webinar 2: Developing an understanding of the problem, developing the background knowledge, understanding, and skills to solve the problem**

#### *Pre-webinar-task*

- Part 1: Reviewing, discussing, and reflecting on exemplar Project-based Learning experiences (PBLs) – how do they introduce the problem and context?
- Part 2: Developing the outline PBL Stage 1: Identify a problem for your project. How will you introduce the Problem and context?
- Part 3: Develop STEM pictures/video.

#### *Webinar*

- Sharing pre-webinar task outcomes (ER)
- Scaffolding Project-based Learning (including learning model, structures, activities, and use of enabling questions) (MW)
- Developing an understanding of the problem, developing the background knowledge, understanding, and skills to solve the problem (Researching the problem) (MW)
- Active Learning (MW)
- Q&A (MW)
- Inquiry-based Learning (MW)
- Q&A (MW)
- Developing a PBL Step 2: Developing an understanding of the problem, developing the background knowledge, understanding, and skills to solve the problem (MW)
- Introduction to the Post-webinar task (MW)
- Q&A (ER, MW)

#### *Post-webinar Task*





- Part 1: Reviewing, discussing, and reflecting on exemplar Project-based Learning experiences (PBLs) – how do they engage the students in understanding the problem and developing their knowledge, understanding and skills to solve the problem?
- Part 2: Developing the outline PBL Stage 2: How will the students develop an understanding of the problem? How will the students develop their knowledge, understanding, and skills to solve the problem? What activities will the students be involved in?

### **Webinar 3: Applying Scientific Investigation within the Project-based Learning Process**

#### *Post-webinar Task*

- Part 1: Reviewing, discussing, and reflecting on exemplar Project-based Learning experiences (PBLs) – how do they engage the students in understanding the problem and developing their knowledge, understanding and skills to solve the problem?
- Part 2: Developing the outline PBL Stage 2: How will the students develop an understanding of the problem? How will the students develop their knowledge, understanding, and skills to solve the problem? What activities will the students be involved in?
- Part 3: Carrying out a scientific investigation

#### *Webinar*

- Sharing pre-webinar task outcomes (MW)
- Scientific Investigation (MW)
- Q&A (MW)
- Applying scientific investigation in the Project-based Learning process (MW)
- Q&A (MW)
- Introduction to the Post-webinar task (MW)
- Q&A (MW)

#### *Post-webinar Task*

- Part 1: Reviewing, discussing, and reflecting on exemplar Project-based Learning experiences (PBLs) – how do they engage the students in scientific investigation?
- Part 2: Developing the outline PBL: Continuing to develop Stage 1 and Stage 2
- Part 3: An engineering design challenge

### **Webinar 4: Applying Design, Design Thinking and Engineering Design within the Project-based Learning Process**

#### *Pre-webinar Task*



- Part 1: Reviewing, discussing, and reflecting on exemplar Project-based Learning experiences (PBLs) – how do they engage the students in scientific investigation?
- Part 2: Developing the outline PBL: Continuing to develop Stage 1 and Stage 2
- Part 3: An engineering design challenge

#### *Webinar*

- Sharing pre-webinar task outcomes (ER)
- Design (ER)
- Q&A (ER)
- Design Thinking (ER)
- Q&A (ER)
- Engineering design (ER)
- Q&A (ER)
- Engineering Design Challenges (ER)
- Developing a PBL Stage 3 and 4: Engaging students in solving the problem and communicating their solutions to the problem (MW)
- Introduction to the post webinar task (MW)

#### *Post-webinar task*

- Part 1: Reviewing, discussing, and reflecting on exemplar Project-based Learning experiences (PBLs)/Engineering design challenges – how do they engage the students in engineering design?
- Part 2: Developing the outline PBL stages 3 and 4: How will you engage the students in solving the problem? How will the students communicate the solutions to the problem?
- Part 3: Meet with and Interview a local STEM professional with regard your project idea (University, government department, business/industry, or community)

### **Webinar 5: Involving universities, industry, and the community (STEM Ecosystem) in developing, introducing, and mentoring projects**

#### *Pre-webinar task*

- Part 1: Reviewing, discussing, and reflecting on exemplar Project-based Learning experiences (PBLs)/Engineering design challenges – how do they engage the students in engineering design?
- Part 2: Developing the outline PBL stages 3 and 4: How will you engage the students in solving the problem? How will the students communicate the solutions to the problem?
- Part 3: Meet with and Interview a local STEM professional (University, government department, business/industry, or community – the STEM Ecosystem)

#### *Webinar*



- Sharing pre-webinar task outcomes
- Developing links with universities, business/industry and the community (STEM Ecosystem)
- Involving the STEM Ecosystem in
  - developing the project
  - introducing the project
  - mentoring the project
  - developing an awareness of STEM careers
- Q&A
- Introduction to the Post-webinar task
- Q&A

#### *Post-webinar task*

- Part 1: Developing links with a local university, business, or community
- Part 2: Sharing your project ideas with your contacts
- Part 3: Complete the development of all stages of the outline PBL

### **Webinar 6: Developing the complete STEM Project-based Learning experience**

#### *Pre-webinar task*

- Part 1: Developing links with a local university, business, or community
- Part 2: Sharing your project ideas with your contacts
- Part 3: Complete the development of all stages of the outline PBL

#### *Webinar*

- Sharing pre-webinar task outcomes (ER)
- Developing the Student Study Guide (MW)
- Developing the Teacher PowerPoint (MW)
- Developing the Teachers Guide (MW)
- Q&A (ER,MW)

#### *Post-webinar task*

- Developing the complete PBL: Student Study Guide, Teacher PowerPoint, and Teachers' Guide

### **Webinar 7: Preparing, managing, monitoring and mentoring students through the PBL experience**

#### *Pre-webinar task*

- Developing the complete PBL: Student Study Guide, Teacher PowerPoint, and Teachers' Guide



### *Webinar*

- Sharing pre-webinar task outcomes (MW)
- Effective teaching (ER)
- Preparing students for Project-based Learning (MW)
- Classroom management (MW)
- Organising students into teams (MW)
- Action plans and log books (ER, MW)
- Monitoring (ER, MW)
- Mentoring (ER, MW)
- Q&A (ER, MW)

### *Post-webinar task*

Continue to develop the complete PBL: Student Study Guide, Teacher PowerPoint, and Teachers' Guide