

# “Forests on Blackboards” Chiang Mai



Project Progress Report: April 2016 - March 2019  
Prepared by: Rattanamon Aisao, Apivit Chansai  
Co-Director: Dr. Stephen Elliott,  
Dr. Sutthathorn Chairuang Sri



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<b>Contact:</b>	Steve Elliott, Forest Restoration Research Unit, Chiang Mai University, Thailand 50200
<b>Email:</b>	stephen_elliott1@yahoo.com
<b>Telephone:</b>	+66 81 531 0894
<b>Fax:</b>	+66 53 892 259

## SUMMARY

This final document summarizes the achievements of the Forests on Blackboards (Chiang Mai) Project over the past 3 years from 1 April 2016 to 31 March 2019. The project was implemented by the education team of Chiang Mai University's Forest Restoration Research Unit (FORRU), to produce environmental education materials for middle secondary school students, to increase their awareness of local environmental problems, focusing on Doi Suthep-Pui National Park). The centerpiece of the project was the development and testing of a teachers' manual, including 6 work modules on various aspects of conservation of the environment on and around Doi Suthep, in collaboration with teachers from 9 local target schools. In addition to supplementary support materials (nature trail booklets, card games and models), a parallel online monitoring and evaluation service was launched to assess uptake, use and effectiveness of the manual and associated materials and to encourage spread of their use beyond the original 9 target schools.



## Project Aim

To raise awareness of local environmental issues among school children and their teachers throughout northern Thailand and equip them with the knowledge and skills needed to enable and empower them to initiate and participate in local nature conservation projects.

## Specific Objectives

To provide local teachers with educational materials to enable school children to engage in practical environmental conservation activities. The objective was to disseminate not only background knowledge but also skill sets that will enable children to work on projects that contribute towards effective solutions to some of the serious environmental problems that affect local communities in northern Thailand, such as: deforestation, forest fires and haze, waste disposal and deterioration of aquatic ecosystems.

## Outputs

1. A modular training manual for school children, covering the most important environmental problems in northern Thailand and how to develop solutions to deal with them.
2. Support materials that enable teachers to use the manual in classrooms to maximum effect and build on it with suggested follow-up activities e.g. nature trail booklets, games and models.
3. Web-based interactive learning tool, based on and complementary to the manual, that creates a community of manual users, provides a means of manual evaluation (on-line tests with awarding of certificates) and makes the manual available as a PDF, long after hard copies become out of print.



*Student Camps*

# PROJECT SCHEDULE

As budget cuts during the initially planned 2-year project prevented printing and distribution of the teachers' manual (the main project output), the project was extended for a 3<sup>rd</sup> year to achieve this goal. The project extension also allowed further testing of the materials, additional education events and the refinement of a much more advanced online component than originally planned.

FOB project schedule		2016										2017												2018			
ACTION		4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3		
1	Work with local education authority to identify target schools	X	X																								
2	Survey knowledge and materials existing in market		X	X	X																						
3	Survey environmental situation in Chiang Mai Province			X	X	X																					
4	Kick off meeting - brainstorming module coverage and contents with teachers					X																					
6	Ad hoc educational events testing modules under development								X	X	X	X	X														
5	Preliminary development and drafting of training manual and workbook						X	X	X	X	X	X															
	PART 1 DRAFTED					X	X																				
	PART 1 LAID OUT								X	X																	
	PART 2 DRAFTED							X	X																		
	PART 2 LAID OUT										X	X															
	PART 3 DRAFTED										X	X															
	PART 3 LAID OUT										X	X															
	PART 4 DRAFTED										X	X															
	PART 4 LAID OUT											X	X														
	PART 5 DRAFTED											X	X														
	PART 5 LAID OUT											X	X														
	PART 6 DRAFTED											X	X														
	PART 6 LAID OUT												X	X													
7	Second teachers' meeting - to refine the draft																X										
8	Preparing Draft 2																X	X	X	X							
9	Testing with school children - feedback and evaluation																							X	X		
10	Final modification for draft 3																			X	X	X	X				
11	Design, layout and proofing																								X	X	
12	Online PDF made available																									X	
13	Project reporting and accounts													X					X								X
	<i>Moved to Y3</i>																										
14	Printing and distribution																										
15	Preparation of online support materials: online learning and evaluation																										

The schedule consisted of various activities with large numbers of school children and their teachers developing and testing both hard copy manuals and online services. The local education authority was first engaged to select target schools for project development, to review the existing materials that were being used in local schools to teach about local

environmental issues and to ensure that the materials produced fitted and complemented the Thailand standard curriculum.

Teachers from nine schools, selected to be representative of the diversity within the education system, then collaborated on drafting the first outline of the manual, which was further embellished to developed drafts of more detailed modules. The modules were then tested during student camps to determine their acceptability, ease of use and effectiveness. As a result, a second teacher’s meeting was held, during which participants worked on improvements to all modules. Finally, the FORRU team made the final modifications to the manual and worked on its design and layout. The online version was made available at the end of Y2, whilst the printed version was launched in Y3.

*3<sup>rd</sup> year project extension*

FOB project schedule		2018										2019		
ACTION		4	5	6	7	8	9	10	11	12	1	2	3	
1	Printing and distribution	X	X											
2	Preparation of online support materials: online learning		X	X										
3	Team test online learning platform			X	X									
4	Testing online learning platform with schools - Feedbacks and evaluation			X	X	X								
6	Promoting the manual - visit all schools in Chiang Mai				X	X								
7	Launching event					X								
8	Increase module in E-learning and get feedback from student						X	X	X	X	X	X		
9	Student camp - test new modules							X		X			X	
10	Report and accounting						X						X	

Five hundred packs including the manual and supplementary materials were printed at the start of Y3 and distributed to schools, not only in Chiang Mai Province, but also to other regions of Thailand. At the same time an IT specialist was hired to develop the online learning platform, which underwent various changes during Y3, as various versions were reviewed by project staff and tested with potential users. The project has been promoted as a generic example of the production of environmental materials for school children and its uptake and effectiveness are now being followed through the online learning platform that was custom-made for this project.



# IMPLEMENTATION

## Liaison with local education authority

The project team liaised with various local education authority officials to i) present an overview of the Forests on Blackboards Project, ii) demonstrate a direct commitment to promote teaching materials based in Doi Suthep National Park and iii) obtain information on school network in 3 districts that border the national park: Muang, Mae Rim, and Hang Dong.

From these discussions, 9 target schools were agreed upon, to represent the diversity of the school system including both upland and lowland schools and town-based and rural schools.



## Survey of existing environmental materials used in schools

The project team reviewed locally used educational materials provided by the Ministry of Education and produced by the Institute for the Promotion of Teaching Science and Technology (IPST). These materials are provided for students in grades 7 to 9 (Secondary level) and are linked to The Basic Education Core Curriculum (2008), both science and social science subjects. Various field visits were also run, with teachers, to assess the environmental situation in and around Doi Suthep-Pui National Park. The main topics that emerged from these visits were air pollution (smoke haze), forest fire, garbage and global warming.

## Forests on Blackboards kick off meeting

The first gathering of all project stakeholders was held in Doi Suthep Nature Study Centre on Friday 9<sup>th</sup> September 2016. The event was designed to produce an initial outline of the structure of manual and decide on the main topics to be covered, based on previous individual school and field visits and knowledge about Doi Suthep presented during the meeting. The event started with a brief history of Forests on Blackboards project in Kanchanaburi by FORRU's former education officer (Joy) who presented the main concepts provided inspiration for the meeting along with advice on how to transfer the project concept to Chiang Mai.



Participants then brainstormed on the selection of titles and contents from the standard curriculum to use in the manual, which resulted in a basic structure of 6 modules or chapters:

- Chapter 1: Geology, Geography, Abiotic condition
- Chapter 2: Biodiversity
- Chapter 3: Interaction
- Chapter 4 Cultures between human and environment
- Chapter 5 Environmental problems and solutions (Environmental Services)
- Chapter 6 Environmental problems and solutions (Biodiversity)

Subsequently the project team developed a book plan allocation the number of pages, images and length of text for each section of the manual, as well as four types of text “boxes” for: information, questions, activities and case studies. The total number of pages was decided to be 176. Formatting guidelines were agreed in advance for smooth book design, using the “InDesign” table top publishing software. The design was vetted by the local publisher for any

foreseeable problems with book production and two project team members were sent for training in use of “InDesign”.

## Student camps

The project ran 3 camps for students from the 9 target schools, during which the content and practicability of the drafted modules were tested and suggestions for improvements discussed. The camps were full-day or half-day events. Programs were run with various student/teacher groups from Upparat Wittayalai School, Navamindarajudis Payap School and Ban Namphrae School, both at the Nature Center and along trails within Doi Suthep-Pui National Park.



## Second teachers' meeting

The second FoB project meeting was held over 3 days from 30/7/2017 to 1/8/2017. It reviewed the evaluations of the modules made during the student camps and discussed ways to improve all modules, in response. Teachers participated in a one-day seminar and two days of field trips at the Nature Centre and Doi Suthep National Park. The teachers tested out various modules directly with the school children, followed by evaluation of content and practicability of the material and activities. This resulted in a very large number of suggested changes to the subject matter and practical activities in the manual, including dropping some activities and adding others. In particular, the need for a more balanced number of activities within each chapter was identified.



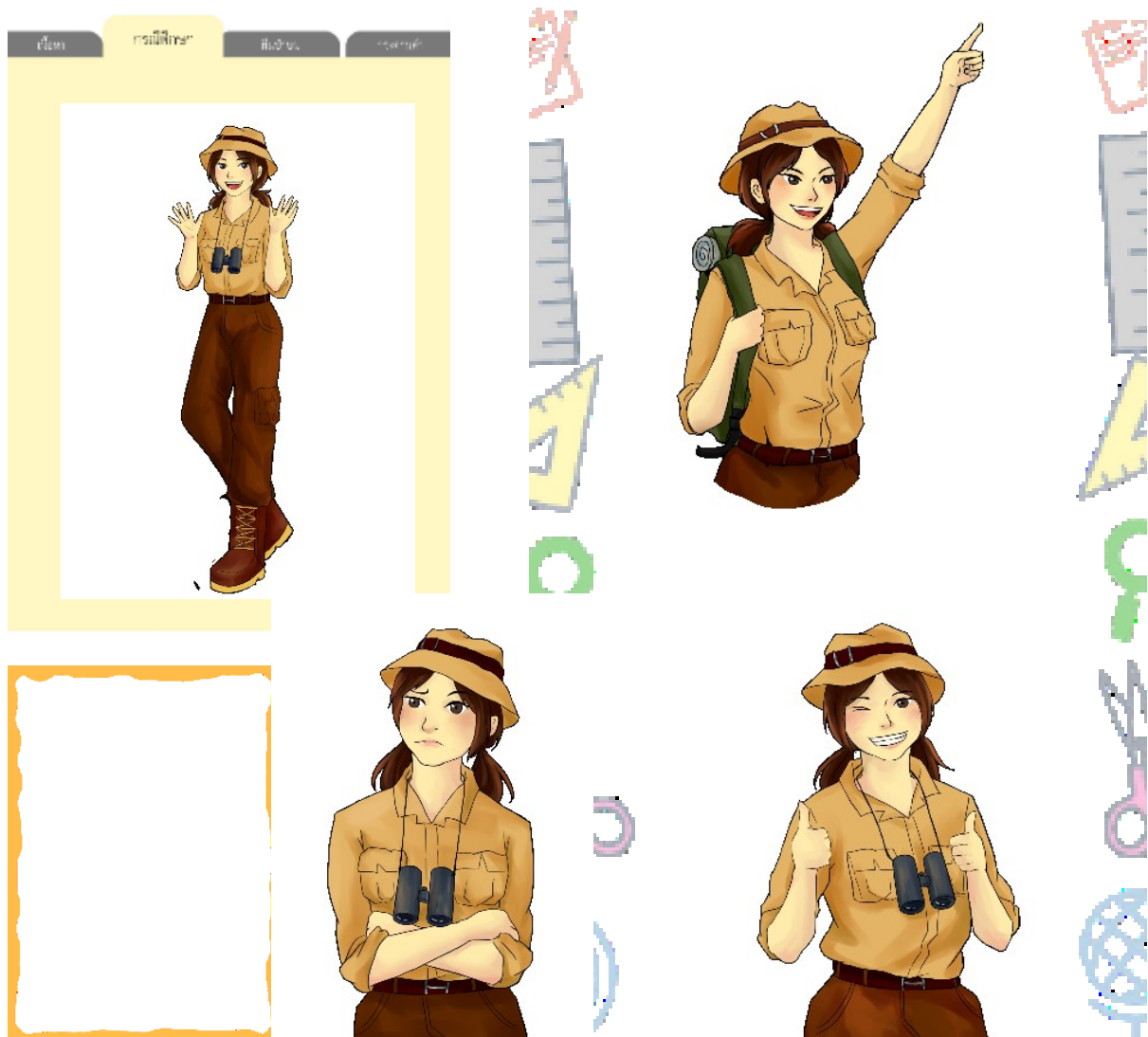


On the first day, the teachers participated in brainstorming the 1<sup>st</sup> draft of the manual, discussing each module. Training to run each module was then provided, which included feedback from other teachers observing. The teachers then ran the modules with pupils and further feedback was generated. And last day, a tree planting event was run which covered activities from Module 6 of the manual.

This generated far too many alterations that could be accommodated within the book structure. So, subsequently the project team had to filter the changes suggested and reach a compromise with the manual’s scope and design. Then work on refining a second draft of the manual began.

### The final draft

Formatting details such as the font, size of contents, and various types of information boxes were developed to give the manual a unique style. The colours of text and headings were standardized for each chapter and a cartoon character “guide” to the manual and online platform component named “Cinnamon” was created.



The final activities for each module was decided as follows:

**Chapter 1 Geography of Chiang Mai Province**

- Physical geography [3D map]
- Geology [Fault model, Nature trail]
- Soil [Soil profile]
- Water resource [Search origin of water]
- Climate changes [Weather map]

**Chapter 2 Cultural interactions between humans and the environment**

- History of Chiang Mai
- Local cultures with environmental conservation  
[Search for resource conservation of hill tribes]
- Beneficial forest product [Search for local tradition, Craft project]

**Chapter 3 Biodiversity**

- Genetic diversity
- Ecosystem diversity [Search for exotic species]
- Species diversity [Nature trail, Biodiversity identification, Bird survey, Tree map]

**Chapter 4 Interactions**

- Biochemical cycles through ecosystems
- Biotic components
- Energy flow through ecosystems [Food chains, Food webs]
- Relationships among forest organisms
- Relationships for Biodiversity [Search origin of fruit]

**Chapter 5 Environmental problems and solutions**

- Garbage [Waste management]
- Droughts, floods and wastewater
- Fire [Calculate Carbon sequestration]
- Air pollution [Carbon footprint]

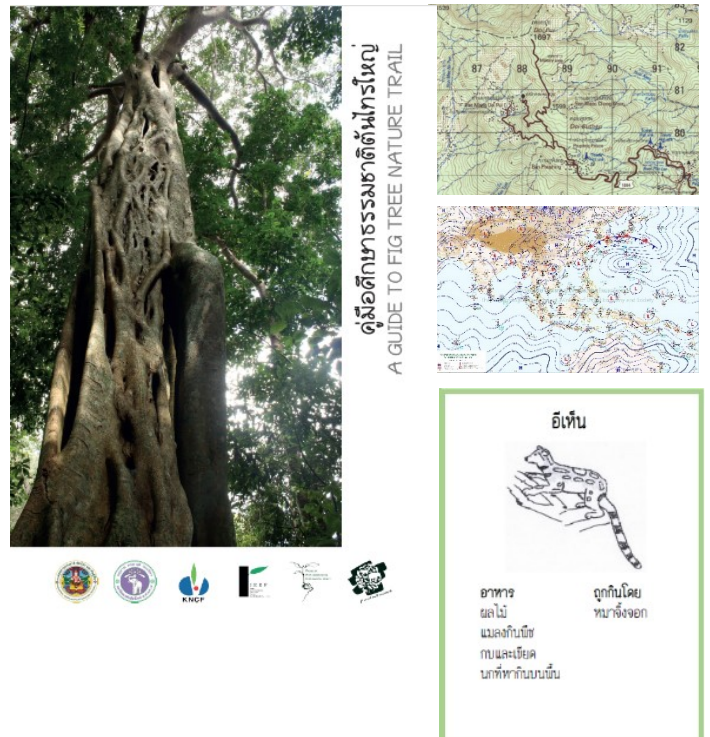
**Environmental problems and conservation**

- Planting [Thinking before planting, Tree planting]
- Camping [Camping at wildlife conservation]



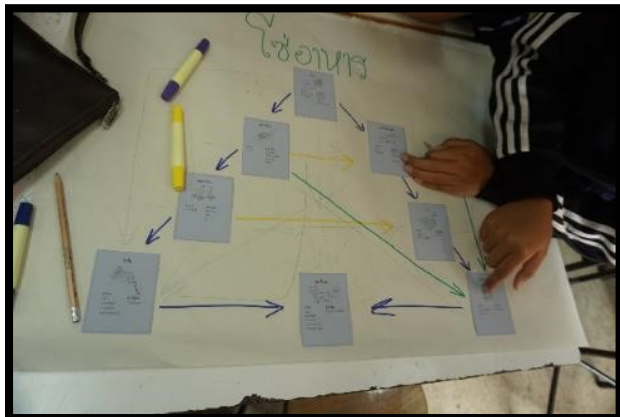
## Complementary printed materials

Additional printed materials were produced to create a teachers' kit. These were designed to be easily photocopied for distribution to large numbers of pupils and included 3D map kit, nature trail leaflets, weather map, food web card game and geological fault model kit. Teachers were provided with the option of copying the materials for each module from the templates provided in the kits or downloading the PDF files from FoB Online. The nature trail booklets were particularly important in providing teachers with a tool that would encourage them to take students out on field trips in the national park with easy to follow maps and information to enrich the experience.



## Testing of complementary materials

Complementary materials were tested with two target schools along within their regular class periods. The food web card game is a simple hands-on module which explores relationships among plants and animals, guided by the teacher. The result was that the game was initially too complicated and the drawings needed to be made clearer. Subsequently the card pack was redesigned and reduced in size accordingly.



## FOB ONLINE

In order to monitor the uptake and effectiveness of the FoB materials and to spread the project beyond the initial 9 target schools, an online learning component was added to provide students with remote access to project access to the manual and an evaluation systems (quizzes). The idea was to merge use of the materials in class guided by the teachers with follow reinforcement and testing online. Motivation included issuing of a certificate from Chiang Mai

University for students who completed all six modules and tests. The system also allows teachers to track student's progress and generate statistics to indicate the overall impact of the project.

<https://fob.science.cmu.ac.th/>



The project team went out to various school to promote the online project components and to train students how to familiarize the students with the graphic interface. FORRU was invited to organize environmental education events that included advertising the FOB project to school students and teachers in Hang Dong School, Navamin School, Ban San Pa Sak School, and Yupparaj Wittayalai School.



## FOB LAUNCHING EVENT

The soft launch event was first set up at Yupparaj Wittayalai School at the same time as they had a STEM festival on 13<sup>th</sup>-14<sup>th</sup> September 2018 focused on increasing skills and knowledge about Science, Technology, Engineering, and Mathematics. The host provided us one booth to advertise and distribute the teacher's manual along with demonstrating some modules to participants. We also handed out the QR code of website on cards so that students could easily access the materials from home.



To reach a wider audience, a hard launch event was hosted by FORRU on 5 November 2018, in cooperation with the Doi Suthep Nature Center location. Many schools were invited to attend and receive free copies of the FoB packs – including the manual, associated materials and the QR Card for logging into Fob online. FORRU hosted a half day event and invited Ms. Tidarat T. Chupraphatthasri (Joy) former education officer, who was responsible for the first FOB project in Kanchanaburi Province with her husband, to present the original FoB concepts and inspiration and explain the generic process of manual preparation and how to contribute and response of the book from school with implementation plan.



FORRU education officers, Rattanamon Aisao presented an introduction to Forests on Blackboards in Chiangmai and Apivit Chansai presented the projects concepts and mission and introduced each and how each fitted in with the national standard curriculum. We also invited Koji to tell the story about FOB since the beginning and about co-operation among KNCF, JEEF and FORRU-CMU.



The FOB online learning platform was launched by key project members pushing a symbolic “button”, which put the website live online.



## FOB CAMP

The launching event stimulated various school to join the project and we received several requests to run introductory sessions using the modules. The first school (San Pa Tong school) came to visit FORRU for a full-day program on 17 December 2018 which included regular modules on tree planting and tree nursery work and introduction to forest ecosystems along the hiking trail from the former national park office to Mon Tha Than waterfall, passing along the Fig Tree Trail, using one of the four nature trail booklets produced by FoB. The teachers observed how to use the booklet so that they would be able to do it again without our supervision. At the end of session, our team also advertised about online learning platform and encouraged the children to do the quiz on that day's modules at home.





Lampang Kalayanee School – two groups came from Lampang Province to participate in an FOB camp on 4 January 2019. The first group comprised grade 7-9, with a half day program at the Nature Centre. The FORRU team provided lessons on the Framework Species Method of forest restoration and local Geography using the manual modules. The students then took part in a forest survey from Wan Bua Ban waterfall to Huay Kaew waterfall (using the nature trail booklet from the project). The second group comprised grade-10 students. Their full-day program started with a lecture on the Framework Species Method of forest restoration, followed by visiting the nature centre exhibition and FoB modules on bird watching, calculating forest carbon sequestration and the food web card game. Students followed the hiking trail to Mon Tha Than waterfall in the afternoon, learning about ecotones and biodiversity on Doi Suthep along the way.



Another event was held at Regina school for environmental day on 20 January 2019. The project crew set up a booth about the stages of forest degradation and ran the wildlife jigsaw game. Most of the participants were primary school level, but we also promoted the FOB project to higher grade students and encouraged them to register for our online learning platform and then gave some a prize if they finished one of the quizzes in each chapter.



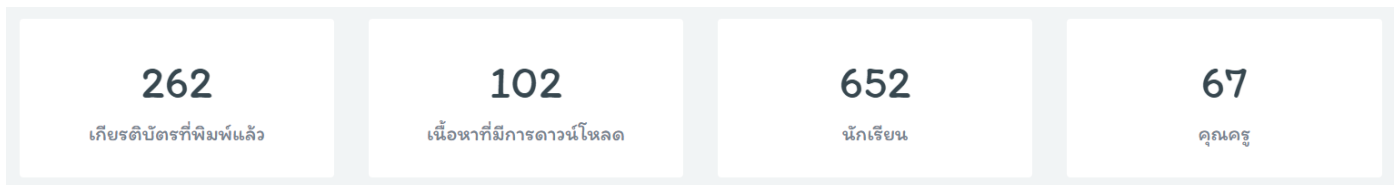
FORRU and Chiang Mai Reading Project set up an environmental education event for primary and secondary school students on 24 February 2019, which comprised viewing the exhibition at the Nature Centre followed by walks along the Thum Rue Sri trail and the Fig trail using the FoB nature trail booklets to learn about biodiversity and the history of Doi Suthep. They returned to the Nature Centre for a demonstration of FoB online interface.



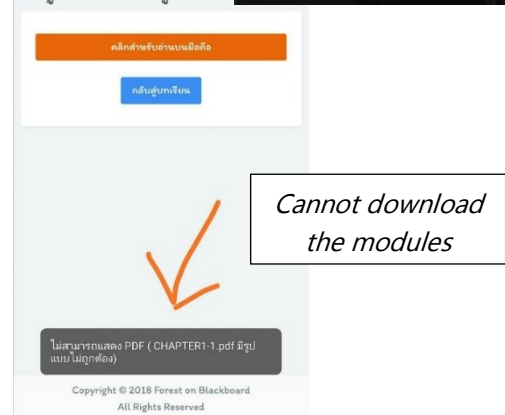
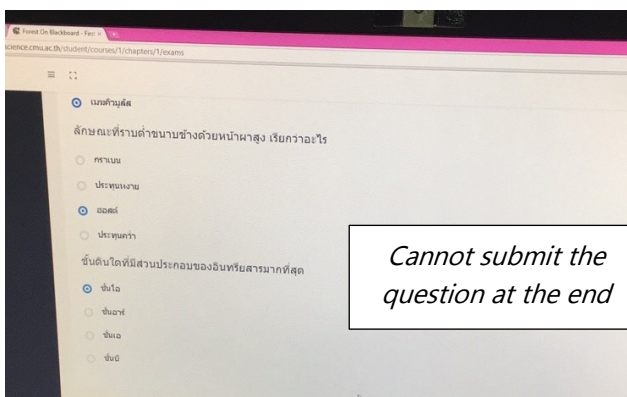
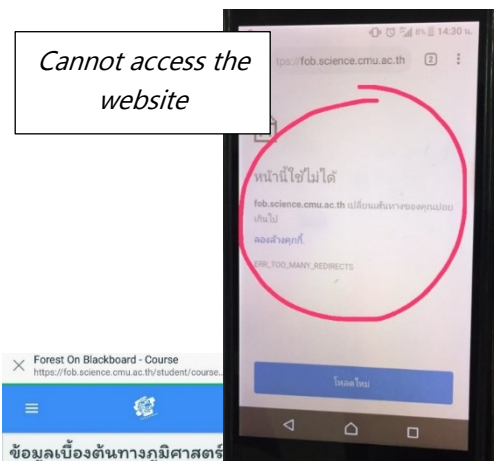
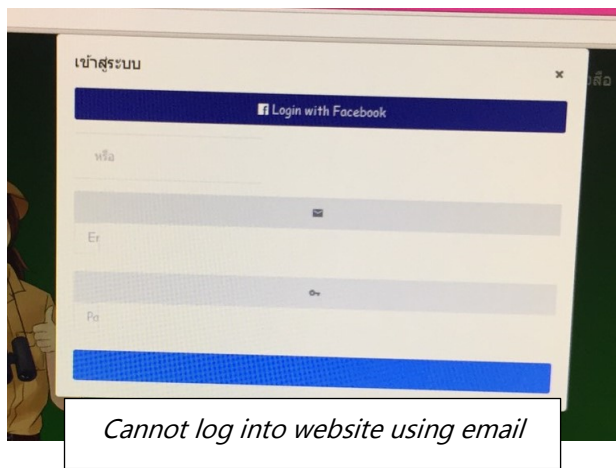
## FOB ONLINE LEARNING RESULT

The system was designed to generate statistics on the uptake and effectiveness of the materials for project monitoring and to enable teachers and students to track their progress. The site includes downloads of the modules and quizzes to test uptake of information by the users. Part of the interface allows teachers to request student records and statistical outputs just for their schools.

At the time of writing this report 652 students have registered, 262 have completed the quizzes and received certificates. There have been 102 downloads of the manual and 67 teachers have registered.



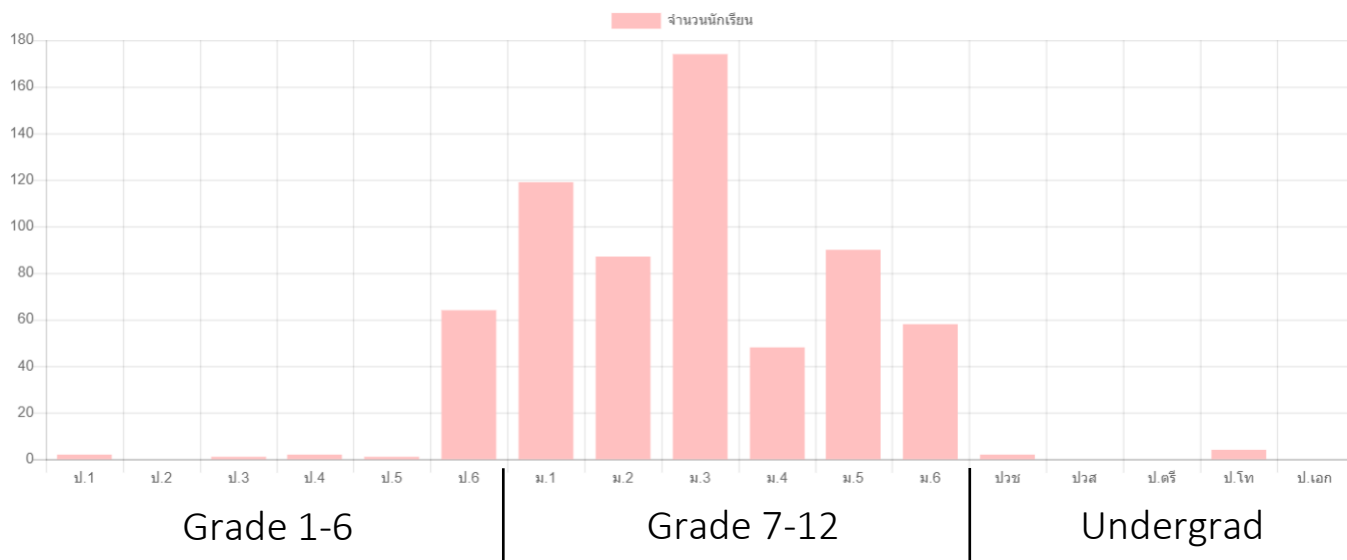
FoB online development proved much more difficult than we thought it would be. We hired a very competent specialist to code the web site and interface system, but we could not foresee an entire working system from the start and so had to have frequent meetings with the software designer to make many changes. It was particularly difficult to make sure the system worked on all platforms, particularly Android mobile phones and older models of computer (which are common in the schools).





Furthermore, problems occurred with double registrations. We found 83 students who registered multiple times, including accounts formed for testing the software. Luckily our site admin staff could run through the list and check each registrant individually before certificates could be generated.

จำนวนนักเรียนแต่ละระดับชั้น



The highest proportion of registrants were in grade 9 followed by grade 7 and grade 11. The latter were interested in using the certificate for their cv when applying for university entrance.

After visiting schools and listening to teachers' feedback, we reduced the quiz per cent mark required for granting of certificate from 80% to 60% (across all modules) and added quick access module summaries to the system. The table to the right shows how uptake is spreading from the target schools to other schools around Doi Suthep. This may be because the system allows students to opt to advertise their scores on FaceBook, attracting the interest of their friends in other schools.

1. ChiangDao Wittayakom School
2. Debsirin Chiang Mai School
3. Navamindarajudis Phayap School (**Target school**)
4. Ban Choengdoi suthep School
5. Ban Donpin School
6. Ban Tungpong School (**Target school**)
7. Ban Namphrae School (**Target school**)
8. Pornprasart
9. Phayaophithayakhom
10. Ban Sanpasak School (**Target school**)
11. Montfort College
12. Yupparaj wittayarai School (**Target school**)
13. LampangKanlayanee School
14. Wachirawit School
15. Wattanothaipayap School (**Target school**)
16. Watchangkian School
17. Varee Chiangmai International School
18. Satriwatabsornsawan School
19. Samoeng Pittayakhom School
20. Sankamphaeng School
21. Sanpatong Wittayakom School
22. SatitCmu Chiangmai School
23. Hangdongrathrathupathum (**Target school**)

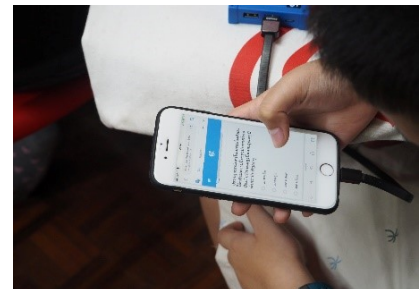
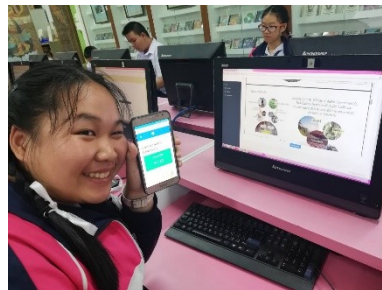


Score Percentage (%)	# students
60 – 70	67
71 – 80	105
81 – 90	76
91 - 100	39

This table shows the number of students in each score class for those that completed all 6 modules. Most students scored 71-80, so the idea to reduce the score required to obtain a certificate was justified.



### TESTING SYSTEM



# SCHOOL VISITS TO PROMOTE FINAL FOB PRODUCTS

