

Co-funded by the  
Erasmus+ Programme  
of the European Union



# Developing Energy Efficient and Smart Lighting Education in Vietnam & Myanmar (DESL)

## Mid-Term External Evaluation

2019 –2021

External valuator

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# 1 PROJECT INFORMATION

Project Title: Developing Energy Efficient and Smart Lighting Education in Vietnam & Myanmar (DESL)

Project Number: 609924-EPP-1-2019-1-FI-EPPKA2-CBHE-JP

Grant agreement number: 2019 1993/001 001

Project Duration: 36 months, November 15, 2019

Coordinating Institution: AALTO KORKEAKOULUSAATIO SR

Partners:

Role	Name	Country
Co-Beneficiary /Partner	YANGON TECHNOLOGICAL UNIVERSITY	Myanmar
Co-Beneficiary /Partner	MANDALAY TECHNOLOGICAL UNIVERSITY	Myanmar
Co-Beneficiary /Partner	VIETNAMESE GERMAN UNIVERSITY	Vietnam
Co-Beneficiary /Partner	EASTERN INTERNATIONAL UNIVERSITY	Vietnam
Co-Beneficiary /Partner	TRUONG DAI HOC THU DAU MOT	Vietnam
Co-Beneficiary /Partner	TRUONG DAI HOC BACH KHOA-DAI HOC QUOC GIA TP HO CHI MINH	Vietnam
Coordinating Organization /Beneficiary	AALTO KORKEAKOULUSAATIO SR	Finland
Co-Beneficiary /Partner	TECHNISCHE UNIVERSITEIT EINDHOVEN	Netherlands
Co-Beneficiary /Partner	UNIVERZA V LJUBLJANI	Slovenia



## 2 Introduction and Project Description

Developing Energy Efficient and Smart Lighting Education in Vietnam & Myanmar (DESL) is a project focused on curriculum development in the field of energy efficient smart lighting. Its main aim is to build or renovate the curriculum of high education institution's courses in the field of lighting at four universities in Vietnam and two universities in Myanmar. Nine universities are involved in DESL project, beside four in Vietnam and two in Myanmar there are also three European universities involved.

Main Objectives of the DESL project are:

- Raise the awareness and to identify needs and opportunities in efficient and smart lighting
- Develop new courses in energy efficient smart lighting based on the local needs
- Modernize the laboratory infrastructure to enhance the learning environments
- Enhance and upgrade the skills and competences of teaching staff
- Strengthen the cooperation between university, industry, public sectors, and society for the promotion of energy efficient and smart lighting

Target groups are distributed among direct and indirect groups: course participants, which are undergraduate, graduate, and post-graduate students, trainers, teachers as direct groups, and professionals at all levels of lighting engineering process, including government officials, and research sectors.

Activities in the DESL project are divided in 5 Working packages, each with two main activities.

List of the Work packages and the main Responsible partner:

- WP 1: Needs assessment and analysis (VGU)
- WP 2: Development of new courses and lighting laboratory (TU/e)
- WP 3: Quality assurance and monitoring (UL)
- WP 4: Dissemination, promotion, and collaboration with industry & society (YTU)
- WP 5: Project Management and communication (AALTO)

Activities and expected results by WPs that are to be achieved at the end of the project's activities in both partner countries:

WP1: Workshop and seminar slides, reports, stakeholder mapping, need assessment reports. Activities under WP 1 were the first to start and completed, including awareness raising seminars, identification of target groups and need assessment activities. Need assessment results are to be used for designing the courses detail content.

WP2: Development of new courses and lighting laboratory based on the local needs is the main part of the project. This WP includes the training of teaching staff, developing and providing lecture modules and lab and exercise materials for each course and running the newly developed courses in partner institutions. New and modified courses are planned in a structure that enables the staff to combine the courses at different education levels as part of regular curriculum at partner institutions in Vietnam and Myanmar and to adjust them to each partner's needs. As per the workplan, this WP has an ongoing activities extended to the end of the project, and courses are to be improved based on the yearly feedback.

WP3: Quality assurance plan, external quality evaluation report, accreditation of the developed courses is designed to assure the quality of the project activities and outcome. One of the main goals is to achieve the accreditation of developed courses in each of the higher education institutions. As an additional measure, an external quality evaluation is to be carried out.

WP4: deals with dissemination, promotion and collaboration with industry and society. The main activities are development of the project website, project brochure, news and articles in local media and social media, student project cases, student thesis works, dissemination seminar materials, student internship reports, establishing of the professional networks of university, industry, policymakers, and authorities.

WP5: deals with project management and communication, financial management, contractual agreement with partners, and finalization of project management procedures. Its main deliverables include project inception plan, project management meeting slides, agendas, minutes, periodic reports, cost reports, and final reports.

### 3 Methodology And Evaluation Criteria Used

External evaluation is a part of the Work package 3 activity. The external's evaluator main goal is to examine the project's compliance with announced activities and outcomes as they were planned in the project proposal and presented in the midterm report, and to propose corrective measures in the case if there is a deviance detected or the project outcome can be improved. Additional comments and proposals for improving the DESL project outcomes are also important aspect of external evaluation.

External evaluation was performed based on all available documentation, internal and external available on the project's official website <http://www.erasmusplusdesl.com/>. External evaluator also attended the mid-term report online session and was in continuous contact with WP3 representative.

Methodology and the scope of analysis was determined on the base of agreement with the chair of WP3, as is declared in Quality Assurance plan and includes evaluation of all available outcomes, including:

- the project proposal with matrix of all expected outcomes and deliverables,
- Quality assurance plan,
- reports of need assessments,
- awareness raising seminars,
- dissemination reports,
- DESL midterm report,
- available data on partners' websites.

External evaluation includes.

- the extent to which declared activity achieved its predicted outcome,
- analysis of outcomes, documentation, and other deliverables,
- comments on possible improvements or shortcomings,
- evaluation of project's effectiveness and sustainability.

## 4 Evaluation of DESL Project Activities by Work Package, and Outcomes

Project DESL activities, expected output, outcomes, and deliveries will be analyzed and presented by Work Packages. Evaluation is based on the Logical Framework matrix (LFM) presented in Project description, and the Quality evaluation of tangible project results as is declared in DESL Quality Assurance Plan.

General remarks found by the external evaluation are:

- DESL is a complex project, involving nine universities from five different countries. The main subject of raising awareness in the field of energy efficient smart lighting is complex by itself and covers several scientific disciplines, which makes it difficult to limit the knowledge strictly necessary to define a successfully study course.
- Project is well managed and the most of activities are carried on as expected, except where unpredicted situations occur,
- Part of the activities are being postponed, due to the social-political circumstances in one of the partner countries.
- Part of the activities had to be adopted to pandemic conditions and were held as online sessions, instead of live one,
- The semiconductor shortage that occurred in 2020 was a cause of postponing the lab equipment setup and demanded adaptation of course development,
- Some of the WP's activities could be improved
- There are some objectives in project description with intangible outcome for which exact evaluation criteria is hard to set, as reaching wider public, social awareness, and establishing partnership with NGO's.

### 4.1 WP 1: Needs assessment and analysis (VGU)

Activities in WP1 are completed, except some parts of activities in Myanmar which postponed. The change was approved by funding institution. The following activities were taken out and deliverables were prepared and made available.

Task 1.1. Needs assessment preparation workshop in Myanmar.

Workshop was prepared and the Document with need assessment objectives, activities, procedures, expected deliverable and time frame was prepared.

Workshop is documented on DESL homepage and deliverable is available.

Task 1.2 Awareness raising seminars and stakeholder workshop in Vietnam and Myanmar:

Activity done with the following deliverables: List of mobilized stakeholders in the Country, analysis of the smart lighting sector, analysis of the education in smart lighting, in the country, list of interests of various interest groups, presentation slides for the awareness of stakeholders on energy efficient and smart lighting

### Task 1.3 Survey using Questionnaire and Interview

Survey was taken out that served as an input for Need Assessment report.

### Task 1.4 Needs assessment report

Based on survey, need analysis report with detailed overview of the issues and recommendation was prepared for both partner countries.

The Needs assessment reports are available via DESL homepage. Reports give some interesting results and could be repeated after the first study year. Some outcomes from the report could be better explained as shown in Figure 1. The reason for low percentage interest in lighting lab equipment is that one of the universities already has state of the art lighting lab, developed only recently in cooperation with one of the industry leaders in lighting technology. There is possibility that other survey results were impacted by that too.

Survey results are interesting, and clearly shows, that main challenge is high initial cost of equipment needed for building energy efficient lighting technologies.

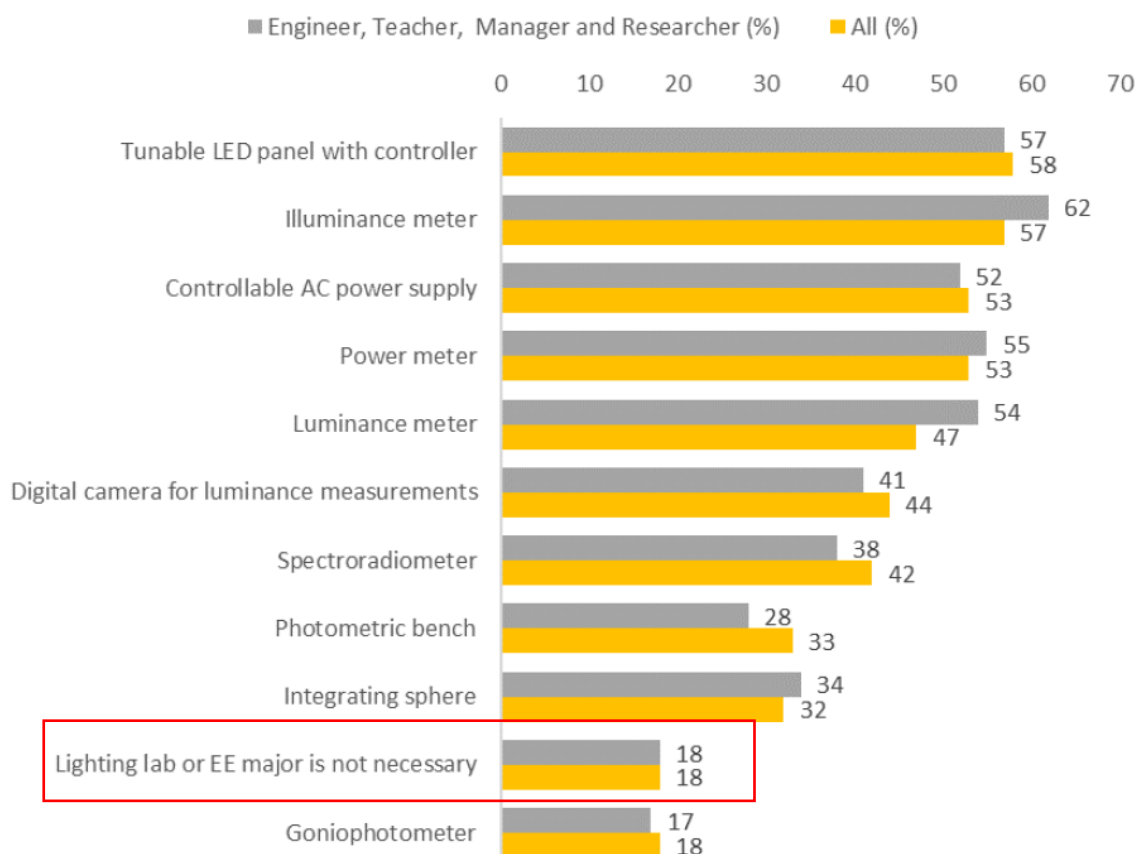


Figure 1: Excerpt from Need Assessment report – question about necessary photometric equipment

Deliverables required for WP1 activities are all published and available via DESL homepage.



## 4.2 WP 2: Development of new courses and lighting laboratory (TU/e)

WP2 activities are, as per the workplan, ongoing activities which are mostly extended to the end of the project, and courses are to be improved based on the yearly feedback.

### Task 2.1 Course development workshop

Conceptual Workshop in the Netherlands: Content of the existing courses and upgrade plan, list of new courses to be developed, detailed structure of courses and lecture modules

### Task 2.2 Content and teaching method development

Compilation of detailed course content, course lectures, exercise materials, active learning materials, report, and guidelines on teaching methods to be used were prepared and communicated with teachers in partner countries. Work was coordinated by TU/e, and online sessions are documented on DESL homepage as shown on Figure 2.

### COURSE DEVELOPMENT WORKSHOP, 15-16 JUNE 2020



Date : June 16 2020

On the 15<sup>th</sup> and 16<sup>th</sup> of June 2020, the University of Technology Eindhoven (TU/e) – responsible for work package 2 – organized the course development workshop. Originally, this workshop was to be held in Eindhoven (the Netherlands) but due to the Covid-19 pandemic this event was transformed to an online event. Organizing online events requires some different attention points. For example, the workshop started in the early morning for the European partners and in the late afternoon for the South-Asian partners (09:00 CEST). Despite the time difference, at least 25 people from all around the

world joined the online workshop. The aim of the workshop was to identify and structure the lighting courses to be developed at the partner universities in Vietnam and Myanmar.

Figure 2: information about course development Workshop [<http://www.erasmusplusdesl.com/detail/news/16#detail>]

### Task 2.3 Establishment of lighting laboratories

Building of Lighting labs at partner Universities was coordinated by partner universities. There is some deviation from set deadline due to equipment shortage on the market at the time, which was mitigated in the second part of 2021. Study courses in summer semester of 2021 are supposed to be possible with new equipment.

Tasks related to lighting lab use were adjusted in time for new courses in 2022.

### Task 2.4 Guidelines for measurements and testing

Developing guidelines on measurement methodologies was done by summer 2021. dates for test setup, and equipment calibration were adjusted with acquiring of lab equipment.

Task 2.5 Training of staff on use of laboratory equipment:

Staff training is coordinated by Aalto University. Subjects of training were measurement techniques, standards, procedures, analyzing and interpreting the measured data.

Task 2.6 Teacher training and course testing:

Training is supposed to be organized in Vietnam and Myanmar for partner country teachers but was partially organized online. Activities also include feedback reports from teachers on teaching material and methodology which were considered for outcomes of Task 2.4. Workshop report is available on DESL homepage as shown in Figure 3.

## DESL | ONLINE "TRAIN THE TEACHERS" SESSIONS

### Q&A | Lecture slides

- 1.2 Photometry



Co-funded by the Erasmus+ Programme of the European Union

Date : August 30 2021

Two day "train the teachers" sessions were organized on 18-19 August 2021. Originally, these sessions were planned as face-to-face workshops in Vietnam and Myanmar. Due to COVID-19, the workshops were converted into online sessions. Work package 2 (Development) leader TU/e organized the online training sessions. 17 teachers from four Vietnamese partner universities participated.

All new or updated lighting courses that will be taught at the associated universities in

Vietnam and Myanmar as part of this Erasmus+ project consist of multiple modules; ranging from light fundamentals to lighting applications. All teaching materials (lecture slides and exercises) were shared with the teachers before the training sessions took place. The teachers studied the materials and came in the meetings well-prepared. The first session covered the first four sets of modules (i.e., lighting fundamentals, light sources, lighting design, and simulations/calculations) and the second session the second sets (i.e., smart lighting, energetic/environmental and economic considerations, light and human, lighting applications).

The training event started with an introduction round of all teachers, lab managers, responsible staff, and project partners after which we dove into the content of the teaching materials. For every module it was indicated at which university the module was being taught and in which specific course. For example, the module *photometry* will be taught at all six universities. There was sufficient time for the teachers to ask questions and some interesting discussions were held.

As a follow-up on these online training sessions, an online simulation training (DIALux EVO 9.2) will be organized for the teachers in October 2021.

(August 30 2021)

Figure 3: Teacher training workshop [<http://www.erasmusplusdesl.com/detail/news/21#detail>]

### 4.3 WP 3: Quality assurance and monitoring (UL)

Work Package 3 activities are progressing as declared in Project and Quality Assurance plan.

As for the final mid-term report, most of the courses were accredited and approved, 2 courses were awaiting accreditation and development of new Courses in Myanmar are on hold, in accordance with new project schedule.

Comment: all new courses are in English language, but not all information on partner universities is available in English, and therefore not easy to find with usual internet search engines, and settings. Project outcome indicators are measured by visible outcomes and more information should be published on project's home page. This is already improved by the year 2022, but there is still information that remains hidden to English speaking users.

There is no information about any activities in Myanmar country available online, due to political situation in this country.

#### Task 3.1 Quality Assurance Plan

Quality Assurance plan was approved by members of Quality Management Team and made available on project homepage. Project's tangible outputs are detailed in plan, coordinated with the project proposal with matrix of all expected outcomes and deliverables

#### Task 3.2 and 3.3 Quality Management of project deliverables – reports on activities and deliverables

Quality management team is monitoring all DESL activities, and evaluating, and documenting outcomes as documents, surveys, feedback.

#### Task 3.4 External evaluation and quality

Online meeting was carried out in late 2021. Live workshop with the results of external evaluation is planned in June 2022.

#### Task 3.5 Accreditation/approval of the developed course

Most of Universities in Vietnam already finished approval process of new courses. As per mid-term report, there are 2 courses, that start in the second study year, waiting for approval.

Activities on building of study courses on MTU and YTU universities in Myanmar status are currently on hold. Changes in project plan are managed by Management team.

Information about approved and running study courses are only partially available, due to language limitations and lack of online information of some universities.

HCMU – information is available via their External Office, only limited in English, as shown in Figure 4 and more information via google translate service as shown in Figure 5.

EE4027

# LIGHT AND EXPERIENCE

Developing Energy Efficient and Smart Lighting Education in Vietnam & Myanmar (DESL)





### LEARNING OBJECTIVES

- Get knowledge of the fundamentals of lighting technology: from wave to energy; Distinguish between lighting quantities, respective units and symbols; Recognize and use basic lighting laws and theories in calculations.
- Have basic understanding of light production technology , luminaire components and their performances; Be able to perform basic lighting design calculations and their validation.
- Have basic understanding of smart and energy efficient lighting; Be able to perform life cycle analysis of lighting systems; Differentiate between visual and non-visual aspects of light.



## Modules:

1. Light and Radiation
2. Photometry
3. Introduction to light generation techniques (+ light sources)
4. Luminaire types and specifications
5. Introduction to lighting design
6. Validation methods of lights designs
7. Introduction to smart lighting
8. Optics of an eye
9. Eye and the sensitivity to light
10. Visual effects of light
11. Non-visual effects of light
12. Lighting applications

HO CHI MINH CITY UNIVERSITY OF TECHNOLOGY

[HTTP://WWW.ERASMUSPLUSDESL.COM/](http://www.erasmusplusdesl.com/)

Figure 4. information about DESL courses on HCMU internet page. mixed language with picture in English

## Opportunity to participate in European-standard subjects at Polytechnic University

Written by: Nguyen Thi Thuy Duong - Posted Date: 06/18/2021



DESL ( *Developing Energy Efficient and Smart Lighting Education in Vietnam & Myanmar* ) is a project within the framework of the program "Erasmus+: Strengthening the international capacity of universities" implemented by 9 member universities (3 universities European universities, 4 Vietnamese universities and 2 Myanmar universities). The specific objective of the DESL Project is to develop the subjects of smart energy efficient lighting systems.

The curriculum and teaching materials of the subjects in the DESL Project are designed *by 3 European universities (Aalto University - Finland, Eindhoven University of Technology - Netherlands and University of Ljubljana - Slovenia)* . with topics required by Vietnamese schools.

Information about Project DESL: [https://drive.google.com/file/d/17I7f9xLZX7fb69bugRvLKIqwO\\_7d1IV/view?usp=sharing](https://drive.google.com/file/d/17I7f9xLZX7fb69bugRvLKIqwO_7d1IV/view?usp=sharing)

Project Website: <http://www.erasmusplusdesl.com/>

DESL project is recruiting students to participate in 03 subjects related to lighting techniques and smart lighting in the academic year 2021-2022 at the University of Technology as follows:

STT	MSMH	SUBJECT TITLE	LEARNING TIME	REGISTRATION TIME	HOW TO REGISTER	Criteria to register for the course...
first	EE4027	<b>Introduction to Lighting</b> (Light and Experience)	From September 2021 (3 credits, configurable LT:2tc, TN:0.5tc, BTL/TL: 0.5tc)	According to the Learning Chart P. Training issued	Apply online, using 9 freely elective credits	<i>Students of the whole school</i> Previous subject: Physics 1
2	EE3099	<b>Lighting engineering</b> (Lighting Technology)	Approximately from January 2022 (3 credits, configurable LT:2tc, TN:0.5tc, BTL/TL: 0.5tc)	According to the Learning Chart P. Training issued	Apply online, using 9 freely elective credits	<i>Student of Faculty of Electrical and Electronics Engineering, Faculty of Mechanical Engineering, Faculty of Civil Engineering.</i> Previous subject: Fundamentals of electrical engineering for students of the Faculty of Electrical

Figure 5: Information about lighting Engineering courses in Vietnamese language, translated online

At TDMU - Thu Dau Mot University, information about lighting Engineering classes is almost impossible to found. The course "Lighting Engineering" started in September 2021 with the participation of 47 students. Besides this course, a project course started in which several smart lighting topics were added to the list of topics the students could choose from.

At VGU, DESL courses are optional. The course "Illumination engineering" started in December 2021. The theory part of the course has now been completed with altogether 23 students. The lab sessions

of this course will be conducted at the beginning of next semester. After these lab sessions, the students are expected to be ready for the next step: the course “Lighting Design and Application”.

Information available online as shown on Figure 6 includes course curriculum and all needed data for Lighting engineering module.

The screenshot shows the VGU website interface. At the top left is the VGU logo (Vietnamese-German University). To the right is a search bar and flags for Vietnam and the UK. A navigation menu includes: About VGU, Study and Admission, Students, Research, Industrial Relations, and Alumni. The main content area lists: VGU General Examination Regulation, ECE Module Catalogue (applied for intake 2020 afterwards), and Optionally additional modules: Developing Energy-Efficient and Smart Lighting Education in Vietnam & Myanmar (DESL); Illumination Engineering; Lighting Design and Application; and Energy Efficient Smart Lighting. Below this is a 'CONTACT' section with admission hotline (0988 54 52 54), telephone number (0274-222 0990), email (study@vgu.edu.vn or eeit\_program@vgu.edu.vn), and consulting hours (8:30 - 16:00). The 'COURSE MANAGEMENT' section features two profiles: Prof. Dr. Peter Nauth, EIT Study Program Director at FRA-UAS, with an academic career including a diploma from TU Darmstadt (1981) and a doctorate from University Mainz (1985), and industrial experience at Romaco-Latues (1990-1997); and Dr. Thai Truyen Dai Chan, Academic Coordinator Vietnam, with an academic career including a master's from KAIST (2008), a PhD from Aalborg University (2012), and postdoctoral research at IFSTTAR (2013) and Singapore University of Technology and Design.

Figure 6: information about Lighting Engineering courses at VGU

## MODULE DESCRIPTION

**Module title:** Illumination Engineering (IE)  
**Module code:** 61ECE117  
**Study program:** Electrical and Computer Engineering (ECE)

### Module content:

No.	Topics
1.	Light and Radiation (Radiant energy and visible spectrum, energy conversion to light, color, eye and vision; different entities of illuminating systems)
2.	Photometry
3.	Colorimetry
4.	Optic characteristics of materials (absorptance, transmittance, reflectance)
5.	Introduction to light generation techniques and light sources (incandescent, electric discharge, fluorescent, arc lamps and lasers; energy efficient lamps; luminaries, wiring, switching and control circuits)
6.	Thermal radiators
7.	Daylight
8.	Optics (eye lenses and light fraction)
9.	Eye and the sensitivity to light
10.	Visual effects of light
11.	Non-visual effects of light
12.	Light perception and experience
13.	Measuring of light and understanding consumers (definition of luminous flux, luminous intensity, lumen, illumination, lamp efficiency, brightness or luminance, laws of illumination, inverse square law and Lambert's cosine law, illumination at horizontal and vertical plane from point source, concept of polar curve, calculation of luminance and illumination in case of linear source, round source and flat source)

### Learning activities:

Figure 7: information about illumination engineering course (part) on VGU site [[https://vgu.edu.vn/documents/10192/2361375/DESL1.Illumination+Engineering\\_Chan\\_Duong.pdf/50173c59-7a5a-45f7-aba6-cdbfe8f4a178](https://vgu.edu.vn/documents/10192/2361375/DESL1.Illumination+Engineering_Chan_Duong.pdf/50173c59-7a5a-45f7-aba6-cdbfe8f4a178)]

At EIU, the course approval process for both courses 'Smart lighting' and 'Illumination Engineering' was expected to be completed by the end of March 2022. Teaching of course "Smart lighting" is expected to start from April 2022. No information about these courses could be found online in English or with translation service.

#### 4.4 WP 4: Dissemination, promotion, and collaboration with industry & society (YTU)

##### Task 4.1 Development and update of project website

The most important work of WP 4 was to build an interactive website for tracking project progress, posting activities, reports and other deliverables, and feedbacks collection of the project

progress. Web site design is attractive and clear, DESL homepage offers access to all important data about project, project activities, news and events, and deliverables.

Some additional maintenance effort could be made. Input about tracking project's activities is important for the website maintenance, and for promotion of the project. Most of the information about running courses and study activities are in Vietnamese language which isn't indexed by the web search engines as well as English. This makes searches about DESL activities to appear very low on the search results, or even not to appear on the list at all. information about running courses is added to webpage as a news entry, there could be some permanent entries to partners' websites, and to information about Lighting engineering activities on partners' universities.



Figure 8: DESL homepage

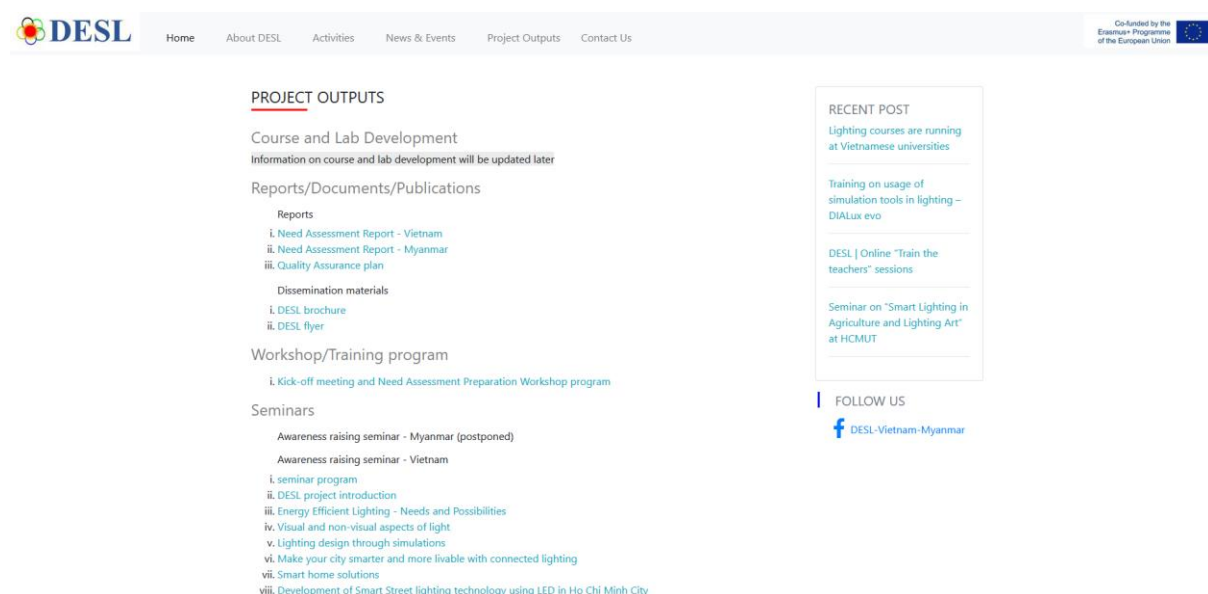


Figure 9: Information on DESL homepage about project outputs



## Task 4.2 Dissemination via local and social media

Initial effort was made for dissemination in local and social media, which is covered on the DESL homepage. A couple of articles were published in local media about starting the project and about student activities in Smart LED Design Contest (SLD) at TDMU.

Article about the project in local media is available on: <https://bantinplus.vn/index.php/hop-tac-phet-trien-dao-tao-chieu-sang-thong-minh-va-hieu-qua-su-dung-nang-luong-tai-viet-nam-va-myanmar-desl.html>

Social media dissemination is limited to Facebook page which isn't maintained as well as DESL homepage. It is available on <https://www.facebook.com/DESL-Vietnam-Myanmar-102449634799291/>.

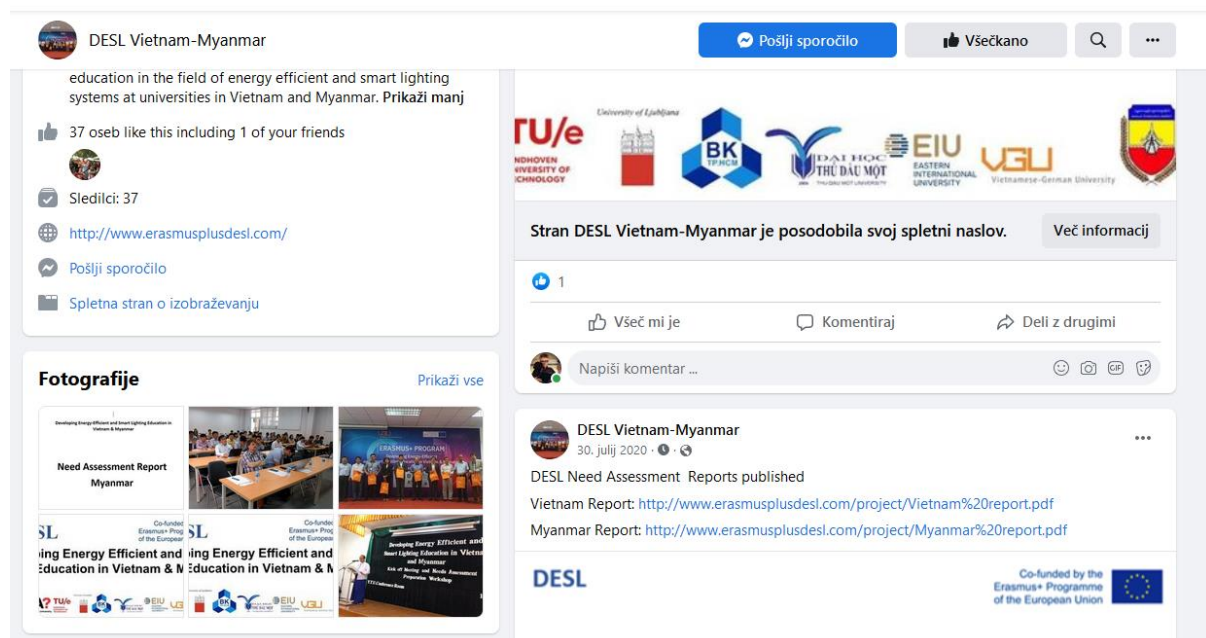


Figure 10: DESL homepage on Facebook

Another planned activity for WP4 is initiating partnership with industry, policymakers, and authorities. Initiating activities is only a part of building social and/or professional network, which is also covered in WP5 activities.

## 4.5 WP 5: Project Management and communication (AALTO)

Work package 5 activities are all carried out as planned and are well adjusted to meet changing conditions with political and pandemic crisis.

#### Task 5.1 Project progress and final report:

Midterm report was published and presented at online meeting in August 2021. Management team is meeting on a regular basis.

Financial report was presented at mid-term meeting and some corrections measures, due to the pandemic and Myanmar conditions, were taken.

Regular Project management Team meetings are taken place every 4 months and communication with WP leaders and coordinators is continuous.

#### Task 5.2 Project inception reports:

Activities on Inception report with procedures, work plan, check lists and forms were carried out in the beginning of the project.

#### Task 5.3 Kick off meeting:

Kick-off meeting with all partner institutions was planned and carried out.

Financial report shows that only a fraction of predicted budget for the first 18 months was actually claimed. This is due to the pandemic, semiconductor and political circumstances that couldn't been foreseen at the planning time. Some of those funds would be transferred in the second midterm of the project.

## 5 Conclusions and Recommendations

Lighting, being a multi-disciplinary subject, is a complex subject by itself. It incorporates disciplines as human anatomy, psychology, physics, electrical engineering, telecommunications, architecture, horticultural science and more. Building up a series of study courses to improve the energy efficiency in smart lighting is therefore a compromise of knowledge at start, which shows the complexity of the DESL project.

Project is very well planned and managed, but some activities could be carried out in a way to improve the full recognition of the work done.

Some predicted outcomes, such as social awareness, reaching NGOs and wider population are very hard to achieve and to measure. These mostly intangible outcomes are expected to improve at the end of the project, as are mostly dependent on project's sustainability.

Some comments and recommendations to improve the efficiency of the project can be found at analysis of WP's activities. The key recommendation is to produce more visual outcomes:

- WP2 could produce more input about its activities to WP4 coordinator. Maintaining a successful dissemination is very dependent on news and activity reports.
- WP3 coordinator could collect and prepare minutes of team meetings on all WPs and prepare additional material for WP4 activity.

Key recommendation for project sustainability:

- More effort could be put into building social and professional networking, which is very important for DESL sustainability. Lighting labs can be an additional opportunity to establish professional networks with industry and NGOs, which also require well connected social network.
- Project social recognition requires reports in local language. Local lighting society could help with this goal. Vietnam Lighting Association isn't very active in the last years but could help in building additional networks with lighting society.