# INTERNSHIPS AS A PROJECT BASED LEARNING FOR INTERNATIONAL STUDENTS AT FT TUL

**Těšinová P**
*Technical University of Liberec, Faculty of Textile Engineering, Czech Republic*
pavla.tesinova@tul.cz

**ABSTRACT**

Internships and trainings are widely used as project-based learning activity for students on mobility. Students obtain practical operation of instruments, skill to run experiment, evaluation of data as a basic skills and knowledge. Preferably it is also acquired planning of project, time management, source search and also working in team. Internationalization is a key to meet different cultures, research styles, characters and experiences. It is no doubt that it improves students involved in kind of internationalization at home too.

**Key Words:** Internship, Project-based learning, Team work, Culture exchange

## 1. INTRODUCTION

This paper deals with results from last years of history of internships at Faculty of Textile Engineering of Technical University of Liberec (FT) and progress in it. Internships started mostly on personal contacts of academicians/tutors at home and at host university. FT has got both mobility, incoming and outgoing, students direction and these years it is based not only on self-payed visits but also on granting by Erasmus+ training opportunities and more.

It needs to be covered with necessary paperwork hence centralized registration helps to increase number of students on mobility, use finance effectively and control capacity of departments. Centralization helps to improve service we give to students and also helps with evidence of internships for future prediction and application for mobility funding. This paper will include numbers of mobility students on various basement of internship mobility with FT, topics of internships, countries and character of mobility. It will be included mobilities as cooperation of two project groups from two universities on research cooperation basis and internships based on exchange of students itself for self-improvement. For example, mobility can start as visits of students only in one direction. How to find attractive topic for getting cooperation more balanced? What offer incoming students to students at FT during their stay in Liberec?

It is good to discuss how internships can help to students at host university and how they can successfully participate not only in the free time activities or buddy system. All engaged parties are subject to progress including teachers/research staff mobility.

## 2. PROJECT-BASED LEARNING

Project-based learning (PBL) builds student responsibility, inspires and empowers them to use their technological skills [1] when teacher-centred instructions turns to student-centred learning. Designing large-scale engineering systems do not provide an environment that promotes the collaboration and synthesis necessary for extending disciplinary boundaries and producing innovative solutions to complex problems. Such problems include the design of engineering systems with numerous components and subsystems which interact in multiple

and intricate ways with social, political, managerial, commercial, biological, and medical systems. Furthermore, these systems are likely to be dynamic and adaptive in nature. Solutions to such complex problems require activities that cut across traditional disciplinary boundaries; this is what we call transdisciplinary research and education [2,3]. It is no doubt that textile related learning and research are multidisciplinary tasks what require systematic concern and wide thinking of the students.

### 2.1 Studies describing Project-based learning application

Engineers including textile engineer graduates are more than one topic specialists. They have to think interactively, solve problems individually same as to be a part in a team and willing to learn for the rest of their lives. Flexibility of graduates from technical universities is important. Project-based learning (PBL) offers advantages described in the following text shortly. Case and project-based learning are described closely with very good specific examples and studies in the literature and author recommends those in [4] about implementation of 3D lab, in [5] about student game-based learning, learning from project termination and project failure in [6] and teaching based on grouping and learning process description in [7]. Yee Ming Lee describes in [8] results on how students developed their skill by their own opinion including Problem-solving, Critical thinking, Team-building, Oral communication and Time management skills. It describes which skills are important and that students are aware about them. Other measures were used in [9]: Experience accumulation, Knowledge articulation, Knowledge codification, Team/Cross-project learning. Full description of evaluation can be recipe from this source. And other good practice in evaluation of effectiveness is in [10] where even distance between learners is studied.

Effectivity of PBL was studied in USA in [11] during Electrical Engineering courses, so technical engineering, with this learner-centred teaching with PBL and traditional lecture in combination. J. Heywood defines process from projects to PBL in [12] with reference to Steed about what project could undertake:

- Investigation of project where experiment is necessary
- Design of apparatus, can also include only design of how to measure as upgrade of standardised measurement
- The planning and layout for a process or project
- An investigation within the field of management.

Small groups can take part in solving a problem and it is work of tutor to overlook on participation of all members [12]. To increase project to project based learning, we can define the major aims what students practise and develop, Heywood refers Cawley in [12] and generalised as:

- Modelling, proposing and analysing solutions
- Critical proposed solutions developing
- Independent study skills
- Oral and written presentation skills
- Finding internal motivation and adapting

When students are included in a group of researchers, academic and technical staff, leading professor divides work appropriate to each. Typically, in a Diploma in Textile Bachelor Study Programme at FT students are working on a project based on experimental work and have to

manage their time with guidance, but defended in front of the 5-8 members of State Exam committee. Period for such a project is two semesters when time-management is defined only by student him/herself. Master diploma work is defined for three semesters and semi-presentations are compulsory as a "credit" to be able to follow for next step in a project implementation into a text 60 pages version of thesis at the end. Project can include more students even research group but thesis is prepared explicitly by one student including literature research and description of results. An important advantage is possibility to link to the previous research on the same instrument with different material on specific measurement on the same material when one student cannot reach all time-consuming experiments or combination of bachelor + master students.

Students on an internship or semester study mobility are often included in research groups. We offer projects on the basis:

- Cooperation with institution on the research project when students cover measurement part and literature research mostly. PBL is included but dependent on the research group and outputs are presented together.
- Cooperation with institution on the exchange of students. PBL is related to the particular topic. Students are included in research groups in host university and tutoring lays mostly on the host university.
- Individual mobility. An exceptional case where PBL is included fully and students are granting their outputs themselves. Only exceptions are working independently when taken topic from home university. Such a project is accepted mainly when equipment offer is unique, future cooperation potential is high, free capacity allow to work on research not combined with others or specialist offers individual advantage to specific laboratory. It gives flexibility but also depends more on the student motivation and project management skills.

Concluding this chapter is done by the schematic diagram from [13] from year 1983 which shows that PBL is not only current topic and we can discuss how effectively is implemented in nowadays universities.

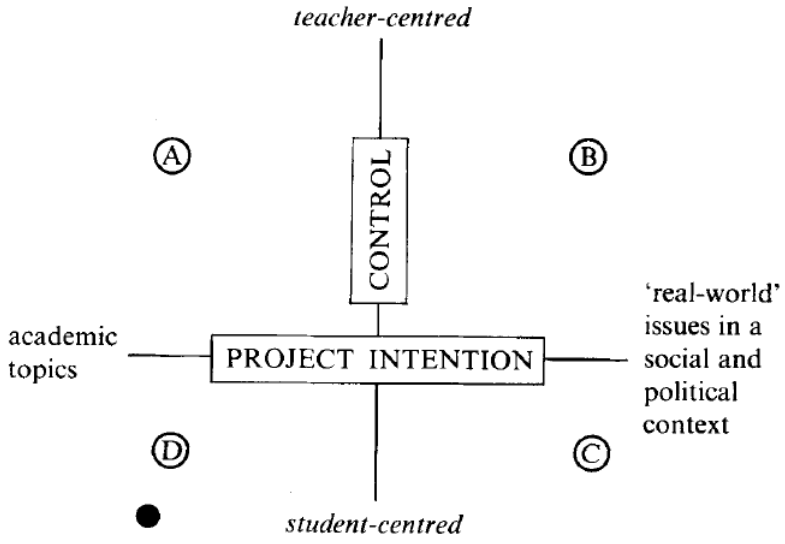


**Figure 1.** Dimensions of project-based learning [13]

## 2.2 Erasmus+

Erasmus+ is the EU Programme in the fields of education, training, youth and sport in act by REGULATION (EU) No 1288/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11 December 2013 establishing 'Erasmus+': the Union programme for education, training, youth and sport. Education, training, youth work and sport are chosen as a key to promote common European values, foster social integration, enhance intercultural understanding and a sense of belonging to a community, and to prevent violent radicalisation [14]. The application form however can only be filled out and submitted by a higher education institution from a Programme Country on behalf of the partners. Programme Countries are those countries participating fully in the Erasmus+ programme: the EU Member States, Iceland, Liechtenstein, Norway, Serbia, North Macedonia and Turkey. Partner Countries are all the other countries in the world [15,16]. Projects in 2016 were not allowed for training mobility and it changed for year 2017 and following.

The selection of students - as well as the procedure for awarding them a grant - must be fair, transparent, coherent and documented, and shall be made available to all parties involved in the selection process. Possible selection criteria are the academic performance of the candidate, previous mobility experience, motivation, experience in the receiving country etc. In case of international credit mobility, the first criterion for selecting students must be academic merit, but with equivalent academic level, preference should be assigned to students from less advantaged socio-economic backgrounds [14]. If more faculties are willing to apply for the same country from one university, it is necessary to cooperate in writing the application to be consistent as a complex still remaining exact description of each activity.

The mobility project Erasmus+ must comprise one or more of the following activities [14,15]:

- Student mobility for studies to/from Partner Countries;
- Student mobility for traineeship to/from Partner Countries;
- Staff mobility for teaching to/from Partner Countries;
- Staff mobility for training to/from Partner Countries.

## 2.3 Internships at the FT TUL

Students are coming to FT to work on a diploma project or internship from EU, Turkey, USA, India, China, Thailand, Japan, Taiwan, Mauritius, Slovakia, Tunisia, Tanzania, Latvia, Pakistan, Ethiopia, South Africa. Topics are wide as it is research related to FT departments from material research, structure and technology creation of products to the evaluation of properties and application of wearable electronics or components. As shown in Table 1, percentage ratio is stable during last five academic years and students on some kind of a project are around 50 % from total number of incoming students. Small increase may seems with a good perspective, because not all internships is confirmed for this academic year and we expect more students.

An exceptional incomings are from USA in nanomaterial and nanotechnology research, from China in materials in filtration and applications of nanoparticles in textile structures, from Japan in wearable electronics, colorimetry and thermo-physiological comfort for example. Diploma or internship are chosen according to the relation to the student study programme, setting in an academic year, agreement of all related parties and granting opportunities if suitable. TUL has got active students who are helping their colleagues from

abroad individually and as members of student's organisations too, for example ESN club. During organised free time activities both sides shear personal look to the culture and mobility gives additional value for all related people.

**Table 1.** Numbers of incoming students to FT in the last 5 years

| Academic year | Incoming students numbers total | Incoming students on the project | Ratio on projects from total |
|---|---|---|---|
| 2018/2019 | 58<br>not final number | 23 internships<br>7 diploma projects | 52 % |
| 2017/2018 | 77 | 38 internships<br>7 diploma projects | 58 % |
| 2016/2017 | 70 | 30 internships<br>11 diploma projects | 59 % |
| 2015/2016 | 77 | 7 internships<br>31 diploma projects | 49 % |
| 2014/2015 | 50 | 11 internships<br>17 diploma projects | 54 % |

## 3. CONCLUSION

Project-based learning acts as an advantage from an internships and diploma work of incoming students. Students obtain practical skills to run experiment and evaluation of data but also soft skills like planning of the project and also finding own place in a team. Internationalization helps students from host university to find a way to understand other cultures and world surrounding us.

FT offers mobility in both ways but it is not possible to send all students. We are doing our best to offer incoming students to solve projects with regular students in present study form not only in a courses but also in project during internships and communication on free time activities.

## ACKNOWLEDGEMENT

The mobility mentioned in the paper was financially supported by Erasmus+ KA107 č.2016-1-CZ01-KA107-023074, Erasmus+ KA107 č.2017-1-CZ01-KA107-034883, Erasmus+ KA107 č. 2018-1-CZ01-KA107-047257, Mobility Fund TUL, Mobility Fund FT and other support and we would like to thank them all.

## 3. REFERENCES

1. Tryggvason G., Apelian D., *Shaping our World – Engineering Education for 21st Century*, The Minerals, Metals and Materials Society and John Wiley & Sons, Hoboken, 2012.
2. Ertas A. Understanding of transdiscipline and transdisciplinary process. Transdisciplinary *Journal of Engineering & Science*, 1, 2010, 48–64.
3. Ertas A. *Transdisciplinary Engineering Design Process.* 1. Edition. John Wiley & Sons, Inc. Hoboken, 2018, 12-13.

4. Yang W., Yuan N., Chinthammit W., Kang B. A distributed case- and project-based learning to design 3D lab on electronic engineering education. *Comput Appl Eng Educ.* 2019, 27:430–451. DOI: 10.1002/cae.22087
5. Davidson S.J., Candy L. Teaching EBP Using Game-Based Learning: Improving the Student Experience. *Worldviews on Evidence-Based Nursing*, 2016, 13:4, 285–293.
6. Shepherd A., Patzelt H., Williams A., Warnecke D. How Does Project Termination Impact Project Team Members? Rapid Termination, 'Creeping Death', and Learning from Failure. *Journal of Management Studies* 51:4 2014. DOI: 10.1111/joms.12068
7. Chikh A., Hank S. Towards a Cooperative Learning Approach Using Intelligence Based Learners Grouping. *Comput Appl Eng Educ* 24:639–650, 2016. DOI 10.1002/cae.21739
8. Lee Y.M. Project-Based Learning Involving Sensory Panelists Improves Student Learning Outcomes. *Journal of Food Science Education*, Vol. 14, 2015, 60-65. DOI: 10.1111/1541-4329.12057
9. Newell S., Edelman L.F. Developing a dynamic project learning and cross-project learning capability: synthesizing two perspectives. *Info Systems J*, vol. 18, 2008, 567–591 DOI:10.1111/j.1365-2575.2007.00242.x
10. Spikol D., Ruffaldi., Dabidias G., Cukurova M. Supervisedmachine learning in multimodal learning analytics for estimating success in project-based learning. *J Comput Assist Learn.*, vol. 34, 2018, 366–377.
11. Yandav A., Subedi D., Lundberg M.A., Bunging CH.F. Problem-based Learning: Influence on Students' Learning in an Electrical Engineering Course. Journal of Engineering Education, 2011, Vol. 100, No. 2, pp. 253–280
12. Heywood J. *Engineering Education. Research and Development in Curriculum and Instruction.* John Wiley & Sons, Inc., Hoboken, 2005, 221-240.
13. Morgan A. Theoretical Aspects of Project-Based Learning in Higher Education. *British Journal of Educational Technology*, No I, Vol 14, 1983, 66-78.
14. *Erasmus+ Programme Guide Version 3* (2018): 10/08/2018 European Commision.
15. Erasmus+. International Credit Mobility. *Frequently Asked Questions for Higher Education Institutions* (HEIs). (2015) European Commision.
16. Erasmus+. *Who can take part?* [online]. European Commision. [cit. 15.04.2019] Available at: https://ec.europa.eu/programmes/erasmus-plus/about/who-can-take-part_en