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Learning outcomes: knowledge, skills and attitudes to be developed through a digital internship program

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INTRODUCTION

Study programs in Professional Higher Education Institutions (PHEIs) typically have the mandatory internship, with defined learning outcomes and ECTS-expressed workload. At the level of HEIs internship is organized to provide structured and applied learning through practical experience and leads to the recognition of learning outcomes, under the supervision of a professional(s) with a significant background in the field of the experience.

When an internship is performed in exchange for ECTS credit, it must be strongly related to an academic discipline, usually with the requirements that students demonstrate what they learned from the internship (keep a journal, write an essay, or complete a presentation). This approach leads to the development of outcome-based internship. This outcome-based learning focuses on facilitating the achievement of desired learning outcomes through the design of learning and assessment activities.

Generally, it is considered that this integration of internships into the curriculum made a shift from treating students as workers who are learning to work, to treating students as learners who are working to learn [1]. Yet, it is clear that internships provide great opportunities for students to develop diverse knowledge and competencies. Importantly, compared to learning in the classroom, learning in the workplace is less predictable and those unplanned learning outcomes may be even more meaningful to student [2], [3].

As each workplace learning experience is different, tends to be less structured as it involves both formal and informal learning, it is clear that the internship learning outcome definition also has to have a student-based component. Even more, when it comes to the digital, virtual or remote internship, it is of a great significance to foresee the advantages and disadvantages in the learning outcomes achievement.

DETERMINATION OF THE LEARNING OUTCOMES

All internships have the general goal of having students apply learning. Clearly, when academic internships are mandatory linked to the curriculum, they have to have more specific learning goals and broader outcomes than just career exploration or learning the basics of professional practice. In addition, mandatory professional higher education internships are very distinctive because they share common goals and elements with the school learning process such as reading, writing, critical thinking, and problem solving.

The goals and therefore learning outcomes, differ depending on the educational level and year of study.

Bachelor work internships

The primary goal of a bachelor work internship is an orientation on possible future employment. Students are introduced to the work field and can gain some experience working in a professional organization.

Master internships

Internships at master's level must have a clear academic or practice-based research component or it is directed to solve a practical problem. If the internship itself does not comprise a research component, student have to carry out an additional research project directly related to the internship. The employer offering the internship must be informed beforehand that student will carry out research, and must be asked emphatically to facilitate this research by allowing time, access to archives or data, granting interviews with employees, etc.

In general, internship learning outcomes in professional higher education are general and study program-specific. There are several categories of internship learning outcomes: knowledge, technical competencies as well as academic-related and non-technical generic competencies (soft-skills) [3].



Focusing on what and how students are to learn requires that an intended learning outcome specifies not only what is to be learned, the topic, but how it is to be learned and to what standard [4]. Well-articulated learning outcomes not only help to guide curriculum design by fostering constructive alignment, but they also make the process of quality assurance more transparent [3], [4]. Importantly, learning objectives focus learning on specific areas and can help student maximize time spent in an internship.

THE STUDY PROGRAM-SPECIFIC INTERNSHIP LEARNING OUTCOMES

The study program-specific internship learning outcomes include the knowledge and technical competence, later is particularly important aspect for the engineering internships. The gain in general knowledge and disciplinary knowledge from their internship experience is students' expectation. Knowledge of engineering and scientific theories and their practice is what is considering as the disciplinary knowledge [5]. In addition, the disciplinary knowledge includes health and safety awareness, knowledge of industrial standards and codes of practice, risk-analysis methods and engineering judgment and an appreciation of appropriate ethical conduct, intellectual property and legal issues in engineering [6].

Interestingly, **the disciplinary knowledge** as the internship outcome appears to be more crucial for the engineering students, comparing with students that perform work-based learning in other, non-engineering subjects. For example, while only 24% of engineering students felt able to apply theory they had learned at university, this figure was as high as 57% for the biologists at their internship positions [6]. Yet, it is important to notice that, in contrast to the engineering placements, the majority of biology/biochemistry placements were at research laboratories and not companies.

Another critical aspect of internship learning outcomes, particularly for the engineering students is achieving of **technical competences**. Technical competencies include: the ability to design and conduct experiments, use techniques and tools relevant to the discipline, analyze and interpret data, and apply knowledge learnt in the university to practical work [3], [5], [6].

Thus, the study program-specific learning outcomes could be defined as:

- Professional knowledge and/or behavior (i.e., learn employer expectations for workplace behaviors; gain knowledge of a specific company/industry; gain knowledge of a specific technological process, learn specific common job functions such as: marketing, management, customer service, accounting, security, PR, production, design, training, etc.; relate classroom learning to its application in the workplace.)



- Specific skill-building. (i.e., improve skills, confidence, competency in specific areas related to study program or particular area of career interest.)
- Project-related skills. (i.e., develop skills in research, analysis, organization, time management, teamwork, multiple task coordination, initiative, adaptability, and project completion.)

GENERIC COMPETENCES AS THE LEARNING OUTCOMES

In addition to study program-related knowledge and technical competences, the development of generic or non-technical competencies is also one of the key learning outcomes of engineering and science internships. It includes development of soft skills, personal attributes and attitudes that are vital for students' whole-person development [7].

Since recently, it was the questionable whether higher education should be responsible for students' generic competencies development. Now days, however, there is only a discussion whether all academic courses should provide students with generic competencies training [8]. In favor of this opinion is the fact that Organization for Economic Cooperation and Development (OECD) claimed that the development of what they call "21st century skills", "employability skills", "soft skills" or "generic skills" is an international priority [9].

When it comes to the importance of the generic skills development during an internship, there is no differences between engineering and other students. They all claim that the internship improved communication and networking skills and that it increased the students' confidence, maturity, independence and motivation [3].

Generic competences as the internship learning outcome can be classified in two categories: academic-related generic competences and soft skills.

Academic-related generic competencies include several important skills required for the accomplishment of the study program in general. This list includes: writing skills, problem-solving skills, the ability to identify the relationship between theory and practice, presentation skills, research skills and language skills [3].

Problem-solving skills and the ability to identify the relationship between theory and practice are highly valued and expected learning outcomes. On the other hand, writing, presentation and language skills are not easily recognized and noted as the internship learning outcomes in professional studies. It particularly, this stands for the engineering students as they mostly dislike writing [10]. However, internship does provide students with the experience in discipline-specific writing tasks. For example, they have to write the preparation of user guidelines

or feasibility study reports, and they all have to write down and present their internship experience, which in turn enhance their awareness of the importance of writing skills for professional practice.

Development of the research skills is dependent on the nature of the allocated task and therefore it is not a necessary part of each internship experience.

Soft skills include a large list of skills such are: interpersonal communication skills, adaptability, time-management skills, planning skills, teamwork skills, professional judgement, independence, positive attitudes (e.g. self-confidence, openness, respect, proactive attitude, conscientiousness) [3], [7]. It also includes communication skills. (i.e., speaking, persuasion (sales), customer service, leadership, and listening — as practiced in the professional world) as well as the employability-enhancing activities. (i.e., gain experience to add to your resume; expand your network of company or industry contacts; earn a job reference to vouch for your performance.)

During the internship learning outcomes articulation, it is an important to present the student with the value of soft skills development. That even more so as the soft skills are not easily assessed. From the perceptions of researchers who question the feasibility of assessing generic competencies, assessment may lead students to eventually lose interest in developing generic competencies and create a situation in which students only learn the skills for assessment [11]

INTERNSHIP LEARNING OUTCOME ASSESSMENT

To be useful, learning objectives should be SMART:

- Specific
- Measurable
- Attainable
- Results-Focused
- Time-Focused

The assessment of the learning outcomes is generally performed during the internship by the student supervisor and by the mentor at HEI upon the internship completion. The assessment by the teacher is typically based on combination of the following indicators, presented by the student:

- Summary of activities on periodic basis
- Personal reflection on professional or skill development related to work duties
- Project and report related to work duties
- Academic papers that require application of concepts from the curriculum (including bachelor or master thesis)
- Industry or company analysis
- Oral presentations based on work experience
- Interactive group exercises based on work experience

Some of the HEI require the second form of assessment where the student providing his/her self-assessment of accomplishing the individual outcome, occasionally coupled with their oral presentation given to their classmates and freshmen in the program.

And finally, of great significance, the third form involves the industrial supervisor who, as an outside constituent, rates student preparedness against the prescribed outcomes.

At the end of the successful internship, students should be able to identify, integrate, and apply both general scientific concepts as well as technical knowledge from their majors to their job environment.

LEARNING OUTCOME ACHIEVEMENT IN DIGITAL INTERNSHIP

Virtual work placement is defined as follows: “a virtual work placement involves the use of an information and communication technology (ICT) supported environment, where students interact with each other and companies independent of time and space and across traditional geographical boundaries. In this environment, effective communications are created between students, faculty and company representatives, in order to carry out a specific and meaningful work-based activity that fits within the student’s compulsory educational curriculum.” [12] (The INTERN project, 2007).

Obviously, the question arises whether the internship learning outcomes are achievable if internship is performed remotely and in virtual fashion?

Study program-specific learning outcomes in digital internship

For the professional higher education studies, the focus is placed on study program-specific learning outcomes. If properly planned, digital internship may provide the student with the same level of knowledge and technical competences as the traditional work place-based learning. Here is important to note that even more so than for traditional work placements, a good definition of the project, a careful preparation and a detailed planning and a clear distribution of roles prior to the activity is absolutely necessary for the learning outcome achievement in digital internship. It is recommendable that the assignments are as such that the student’s contributions are esteemed valuable to the company. It is crucial to ensure that the student is not just be passing time behind the desk.

Helping student to achieve the study program-specific learning outcomes in virtual work placement requires a specific pedagogical approach. The approaches such as guided independent self-study, collaborative learning, problem/project-based learning are shown to be good methods for the organization of virtual activities.

The achievement of the technical competences, such as the ability to design and conduct experiments, analyze and interpret data, and apply knowledge learnt in the university to practical work, is in large extent feasible in the virtual internship model. However, the achievement of the learning outcomes that include the use of techniques and tools relevant to the discipline can be limited in digital internship, if the particular technical competence is associated with the use of specific equipment. Yet, this can be, at least partially, overcome by the usage of video tutorials, augmented reality or similar approaches.

Generic competences in digital internship

While the study program-specific learning outcomes, as the priority of the internships in professional higher education, can be easily achieved in virtual model, the achievement of the generic competences can be a larger challenge.

Yet, the achievement of the academic-related generic competencies, including writing skills, problem-solving skills, the ability to identify the relationship between theory and practice, presentation skills, research skills and language skills are not limited by the virtual setting for the internship conduction. All of these skills are required for the internship assessment stage, as this is the process that in a large extent includes writing different kind of reports and presentation. Moreover, the virtual format actually potentiates the significance of the written communication as this is the primary way for students to express themselves.

On the other hand, the soft skills development may be affected by the virtual internship, comparing with the internship in real work environment. The virtual internship is somewhat inferior to the traditional work based-learning when it comes to the development of interpersonal communication skills, adaptability, teamwork skills, professional judgement, positive attitudes, speaking, persuasion (sales), customer service, leadership, and listening — as practiced in the professional world.

However, the virtual internship model is actually superior to the traditional internship in development of time-management skills, planning skills and independence. In virtual internship students engage in a professional learning experience independent of their physical location, be it their homes, their home institutions or a host university. As well, there is a flexibility regarding the working hours. Although this means that virtual internships can provide a way to combine studies, work and social life, it brings more responsibilities to the student to perform job independently. Importantly, student has to develop good time-management and planning skills and avoid procrastination issues.

CONCLUSION

In order to accept the virtual internship as the legitimate model for the mandatory, study program-related and ECTS awarded element of the curriculum in professional higher education, it is required that this type of work-based learning is providing a student with the same learning outcomes as the real work experience. As virtual internship can provide the adequate level of the study program-specific knowledge and academic-related generic competences, it could be concluded that this mode of learning can be incorporated into professional study programs.

However, there is a concern that soft skills, particularly the communication skills can be downsized by the virtual internship, comparing with the communication in real work environment. Yet, one has to be aware that today students are typically very familiar with the online communication. Even more, the 4th industrial revolution that blurred the boundaries between the physical, digital, and biological worlds actually require a development of distinctive communication skills. Thus, the limitation of virtual internship concerning the communication skills and finding the new modes for the online communication could easily turn into the advantage for the students' future work.

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