tourings

training for collaborative
robotics integration

TOURINGS
Educational Philosophy

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1. Introduction

The TOURINGS Project aims to design and develop a common curriculum and learning approach on Collaborative Robotics and its installation and proper integration on manufacturing companies. This will meet the learning needs of manufacturing companies in terms of training, both for workers and managers, in order to have a fully understanding of collaborative robotics, both in terms of technology, security, adaptability and interaction with staff. As Europe's ageing population increases, highly trained practitioners and a skilled workforce will be required to meet the growing demand for human-robot collaboration to accommodate the needs of their production.

- Why compose an Educational Philosophy?

-To dialogue and articulate our individual educational and subject/discipline/professional values

-To negotiate and agreed shared vision and some common values.

It is important to draw together the programme team to consider/discuss the views on how students learn best in this context. Having an Educational Philosophy Statement at the beginning of the programme can communicate the students and academic staff the rationale for particular teaching, learning and assessment approaches, the lack of a common Educational Philosophy impacted on programme sequencing and coherence.

The Educational Philosophy is a Statement agreed by the team that sets out the programme's purpose, education and professional values, the nature of the learning environment for students and the key approached to teaching, learning and assessment. The starting point of a programme design is; I) The consideration of the needs and resources of the programme, II) The development and articulation of a vision and set of values that the programme tam aspire to, and III) Early consideration of students needs and pathways.

For the development of this Educational Philosophy Draft Delivery we have supported our Statement on the following questions:

- Are we being clear and concise?
- Are we being critical?
- Are we engaging the students in problem solving?
- Is our approach working?
- What is it we hope that students will have learned, that will still be there and have value, several years after the course is over?
- What would the students have to do to convince us that they have achieved these learning outcomes?

2. Educational Philosophy Statement

- *Are we being clear and concise?*

For the creation of the training course, different roles are defined to represent different degrees of expertise in collaborative robotics.

In the first step, an assessment of the group of individuals who will approach the course itself takes place. Once that the target audience has been selected and the applicable role assigned, an in-depth analysis of the main characteristics of the group of people is necessary. In the TOURINGS project, the audience is composed by professionals, which may have or have not a global knowledge on robotics or collaborative robotics.

For this reason, the learning material has to be well balanced in order to be easily understandable for those lacking in the general knowledge of the industrial automation and at the same time, it should avoid the risk to be tedious for the others. This is to be addressed by the individual presentation of the learning content according to the identified role.

Moreover, the platform used for the distribution of the learning material must respect some fundamental characteristics:

- Be usable by all, therefore be accessible;

- be intuitive and easy to use (not complicated);

- Have a clear information architecture; and

- Be built on the needs of the project, the themes, the teachers and the students.

The platform designed for the project will have the utmost attention to web accessibility (see https://www.w3.org/WAI): attention to colors, user interaction, accessible images and videos and so on. Moreover, it will have a valid information architecture that will to allow an easy and pleasant use of the learning contents and takes into account the needs of all the variables in the field: the course objectives, topics covered, teachers and the students.

When conveying the comprehensive information, the following should be taken into account:

- The learning content must be clearly defined;

- The individual learning units must have a clear thematic reference and be distinguishable from each other.

- Information should be presented in a selective manner; the student must not feel overwhelmed or "swamped" by too much information but also not underchallenged;

- The information conveyed must be presented in a way that is clearly understandable;

The division into learning modules 1 - 5 forms a good basis.

1. To our understanding, implementation of cobots is at the same time a technical and human topic which requires, each time, precise knowledge about the way to program cobots, to put them in place in assembly line, to put in place safety and health conditions and to develop required knowledge of operators.

2. We will address a diversity of workers, more generally speaking employees, interested in this topic. Some will be very experienced and some others will be more “neophyte” about the topic. What could be great is to offer the opportunity to both of them to get trained according to their knowledge level.

3. If we want our program to make a difference and to be credible, it will have to be clear and precise. We are competing with training programs developed by cobots producers. Moreover, the training content will have not to be time consuming for learners. They are some professionals, or future professionals, and their time is limited.

- *Are we being critical?*

Helping people learn in ways that are easier, faster, accurate and inspiring should be the prior objective of online courses. During the Covid-19 pandemic situation, teachers and students have been challenged as never happened before; this leaded to a brand-new way in the use of alternative technologies to support the students in their academic objectives. This recent experience should be considered during the definition of the different modules of the online course and as soon as topics, study objectives and target audience have been defined, the most suitable technology for creating learning objects should be identified (such as the use of H5P https://h5p.org). Within the TOURINGS context the use of videos or interactive material will be ideal in order to help the experts in understanding how the interaction with collaborative robotics works. Through interactivity, the participant experiences a better learning experience and is encouraged to actively participate.

Being critical is not the purpose, by itself, of the training about collaborative robotics. We could give a critic only as an opening by concluding the training content. But the training aims to give technical knowledge and not critical insight about the use of collaborative robotics. By being critical, we get the risk to shadow what is really important in the training content.

- *Are we engaging the students in problem solving?*

The use of collaborative robotic entails a change in the worked approach to its everyday activities. The course should be support and encourage the worker in understanding how:

- find correct applications for the Cobot;
- to use the Cobot correctly;
- To use the advantages of the HRC correctly;
- interact with cobot;
- identified and solve real life problems in the collaboration set;
- identify possible security risk;
- understand how to avoid possible misbehaviour.

To achieve our training goals a right balance between theoretical and practical lessons is needed.

1. Because learners are different in their way of learning, from a cognitive point of view. Schematically, we have two kinds of learners: deep learners and surface learners. Deep learners will be interested in knowing everything about the content. Surface learners will be more interested in understanding main ideas and main articulation of ideas. Deep learners are more interested in the accuracy of the content and surface learners,

in general, are more interested in “problem solving”. For a matter of credibility, we think it is crucial to address both targets.

2. Because expectations of learners are different. Some will just expect general knowledge, some others will expect knowledge which will help them to solve problems in their (future) company.

- *Is our approach working?*

Training courses are intended for people with different learning abilities and preferences, for this reason they must have a dynamic approach to the concepts taught in order to be able to meet the needs of different groups of individuals. The use of different Educational technology may guarantee that our approach is the most balanced and functional to the specifications and objectives of the project. By defining different learning roles, the learning content can be individually adapted to the needs of the participants.

- *What is it we hope that students will have learned, that will still be there and have value, several years after the course is over?*

The aim of this training program is twofold:

- First to help learners to gain knowledge about what is collaborative robotics, how it works, what are the safety rules and how to put it in place in company.
- Second, to help some learners to be able to solve some concrete problems by putting in place cobots in the assembly line in their (future company).

Collaborative robotics has numerous applications in different fields and its implementation is adaptable to different situations. The online course should ensure a good general preparation in relation to: the interaction with cobots, identification of real life problems and resolutions, critical evaluation of the risk and the capability to avoid any misbehaviour.

The collaboration with a robot will became friendlier and the opportunity to work synchronously will be seen as a benefit for the performance of expert task. Cobot applications are considered more often, as the training course provides a good basis for understanding the potential of cobots and how they can be used. In the longer term, this knowledge can be used to implement applications in other areas or challenging applications.

- *What would the students have to do to convince us that they have achieved these learning outcomes?*

The training course should allow students to easily express their educational feedback, we will identify and apply the right learning feedback and training path monitoring systems. Based on a real-life case, we can evaluate experts’ technical knowledge together with their ability in identify and propose solutions to problems and misbehaviours. Through the use of interactive learning tools, learning outcomes can be reviewed and recorded.