Tommy Hvidsten

Documentation of pilots

Continuing education in Industrial Digitalization for skilled workers

01.08 – 31.12.2020

Introduction

This document contain the documentation of "Continuing education in Industrial Digitalization for skilled workers 01.08 – 31.12.2020". The document contains a description of the settings and the motivation of the case, as well as an overview of the key performance indicators (KPIs) for the pilot. The execution and documentation of pilots are part of larger process, named Educational Framework, aimed at transforming educational programmes for future Industry 4.0 capabilities. The case/pilot is chosen based on two initial analysis, respectively focused at industry and the institution. For further information regarding the overall process, please see the document 'Educational Framework'.

Contents

- Description of pilot (summary)

- KPIs and how they are measured

- Implementation of the Educational Framework
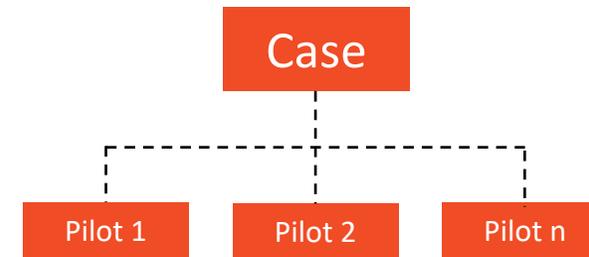
- Results (KPIs) and evaluation

Fig. 1. The figure shows the relationship between the two terms: *case* and *pilot*.

Description of the pilot (summary)

The case is a 30 ECTS course in Industrial Digitalization branded as "Industrifagskolen" ("The Industry College"). The course was developed in 2019 as a joint project with Norsk Industri (The Federation of Norwegian Industries) and Fellesforbundet (The United Federation of Trade Unions) supported by the Norwegian government through Kompetanse Norge (Skills Norway).

The course has three modules of 10 ECTS, and the selected pilot cover the subject "Agile Production". The bordering subjects are "Internet of Things" and "Industrial Intelligence". It is a part of FTO's department for Industrial Digitalization bordering the regular fulltime and part-time (online) studies.

The course was planned and partly completed as on campus training one day per week. Due to the Corona outbreak the last third of the course was completed as online training according to the "flipped classroom" model complemented by synchronous tuition.

Description of the pilot (summary)

- The course, Agile Production, is based on the following learning outcomes from the syllabus:

- Knowledge
  - Logistics and communications
  - Machine authonomy and Robotics
  - Material handling
- Skills
  - Use 3D modelling software
  - Use robotics programming tools
- Competencies
  - Can establish relations to fellow professionals within the field of agile production and relevant external stakeholders such as government regulators
  - Can act professionally in agile production to optimize resource spending and economic results based on a holistic perspective and ethical considerations

With the support of the Erasmus+ Programme of the European Union

KPIs and how they are measured

The following KPI's was measured through a survey after the completion of the course:

A. *Compliance between experienced and announced learning content*
    - *After the course the students are asked to rate their opinion of how they experience the learning content towards their expectations on a scale from 1 to 5 were 1 is Totally agree and 5 is Totally disagree*

B. *Quality of learning processes*
    - *After the course the students experience of the learning process was measured by seven positive statements regarding aspects of the learning process. The students provided feedback by rating their agreement with the statements on a scale from 1 to 5 were 1 is Totally agree and 5 is Totally disagree*

C. *Perceived quality of lectures and tutorials*
    - *After the course the students experience of the learning process was measured by three positive statements regarding aspects of lectures and tutorials. The students provided feedback by rating their agreement with the statements on a scale from 1 to 5 were 1 is Totally agree and 5 is Totally disagree*

D. *Compliance between achieved learning outcome and the learning needs*
    - *After the course the students experience of the learning process was measured by three positive statements regarding aspects on how the learning outcome have contributed towards their professional development. The students provided feedback by rating their agreement with the statements on a scale from 1 to 5 were 1 is Totally agree and 5 is Totally disagree*

Implementation of the Educational Framework

The educators allocated to the course, a total of 3, was presented with the educational framework. First as written articles and the through the e-learning portal. The pilot was planned according to the principles of the framework, including the transition to online training due to the corona outbreak.

The course has consisted of 18 lectures and tutorials. The lectures has been presented as flipped classroom and the tutorials have been centred on authentic tasks. The exercises have also been on authentic tasks, and the composition of the student teams have been influenced by the principles presented in the TEFFIC pedagogic framework. The course was kicked off by a physical gathering of four days, the rest of the coursework have been net-based, so the principles of blended learning has been applied and simulations have been a part of the exercises.

Results and Evaluation, spring

KPI	Score (1 to 5)
Compliance between experienced and announced learning content	4,2
Quality of learning processes	4,0
Perceived quality lectures and tutorials	3,5
Compliance between achieved learning outcome and the learning needs	3,7

- Feedback from educator: *The modules are really well made; informative, structured and not to long*
- The results was affected by the corona situation

Results and Evaluation, autumn

KPI	Score (1 to 5)
Compliance between experienced and announced learning content	3,5
Quality of learning processes	3,9
Perceived quality of lectures and tutorials	3,6
Compliance between achieved learning outcome and the learning needs	3,9

Results and Evaluation, autumn

- The autumn course started with a physical convention of four days following online learning after a flipped classroom model. Another four days physical convention was planned by midterm, but this was replaced by an online convention with synchronous lectures and mentoring.

- The evaluations show a 0,7-point drop in the experienced learning content versus the announced (towards the spring results). This may be attributed to a communication breach before training, as the content was the same.

- The quality of the learning process is still reported as high, although there is a 0,1-point drop. This is within the error margin, so it may be deemed insignificant. The same is the case for the perceived quality of the lectures and tutorials, where there is a 0,1-point increase.

- The Compliance between achieved learning outcome and the learning needs have a 0,2-points increase.

- In general, the students give the quality of learning process a high score despite the fact that it to a large extent takes place online. The focus on authentic tasks, and the application of the other elements of the pedagogic framework, is attributed to this success.

With the support of the
Erasmus+ Programme
of the European Union