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ETAT - Education & Training for Automation 4.0 in Thailand: Survey Results

Dr.-Ing. Dipl.-Wirtsch.-Ing. Erwin Rauch

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Smart Mini Factory
Laboratory for Industry 4.0
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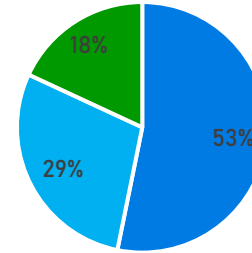
Industrial Engineering and Automation (IEA)
Faculty of Science and Technology
Free University of Bolzano

Sample Overview

A total of **94 participants** took part at this survey:

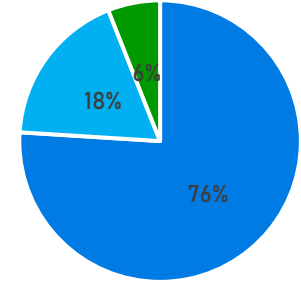
- **50** of the participants were **students** from university in the greater Bangkok area,
- **17** of the participants were **teachers/professors** from Thai universities at Bangkok and
- **27** participants were professionals from **Thai industry**

Participants - Survey ETAT 4.0



■ Student ■ Professional from industry ■ Teacher/Professor

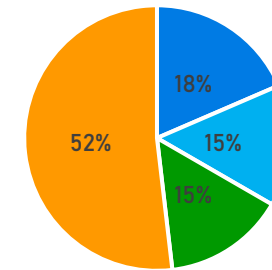
Student level



■ Bachelor ■ Master ■ Research Doctorate

Size of the companies

- Micro (0-9 employees)
- Small (10-49 employees)
- Medium (50-249 employees)
- Large (>250 employees)

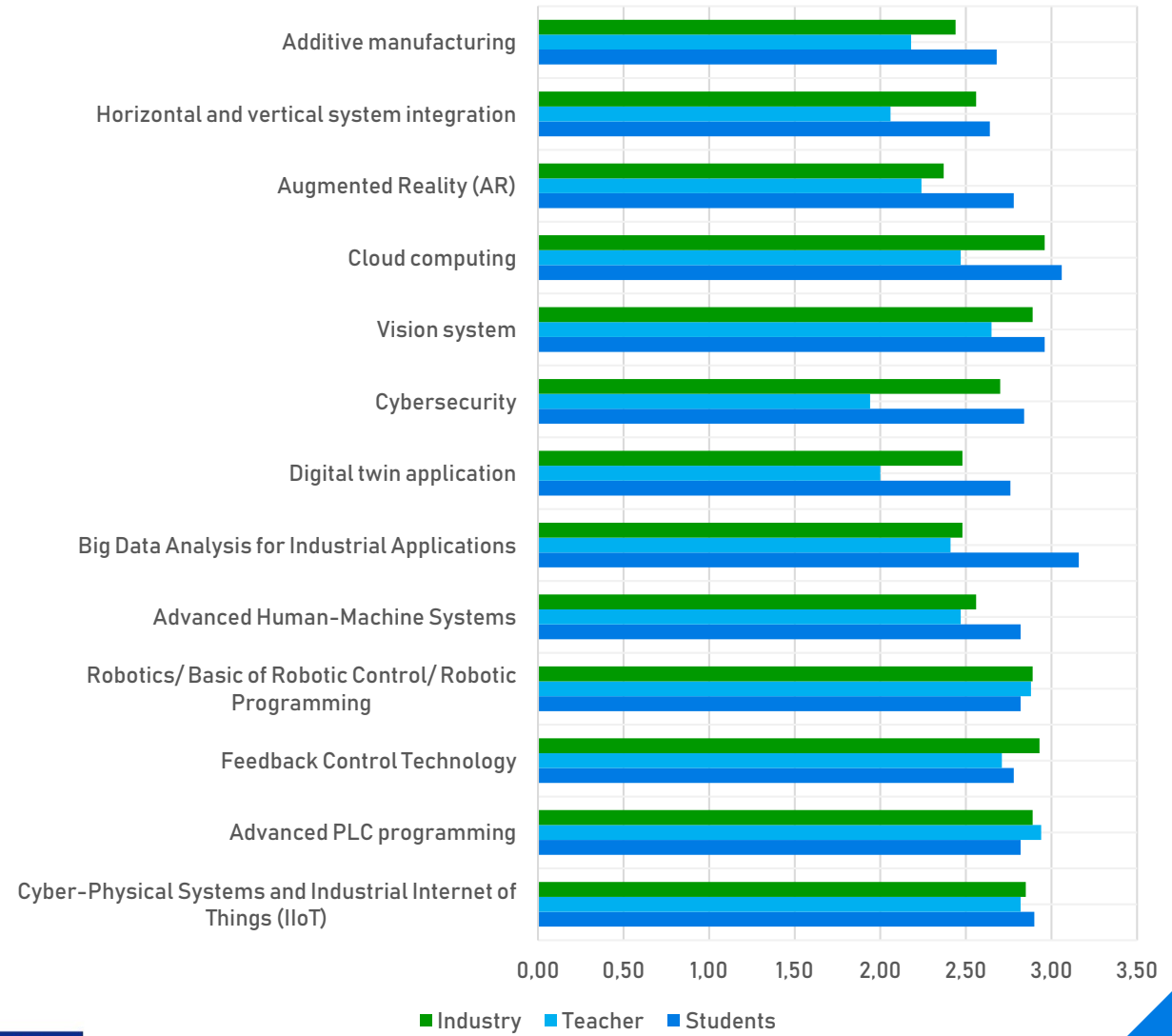


Current State Analysis

Knowledge level

- Teacher have a more pessimistic view compared to students and professionals.
- Students feel to be most confident with Automation 4.0
- **Good knowledge** in robotics, PLC programming, Industrial IoT.
- **Medium-level knowledge** in vision systems, cloud computing, feedback control, big data analytics and human-machine systems.
- **Lowest knowledge** in cybersecurity, augmented reality, additive manufacturing, horizontal/vertical data integration and digital twin application.

Knowledge in Automation 4.0

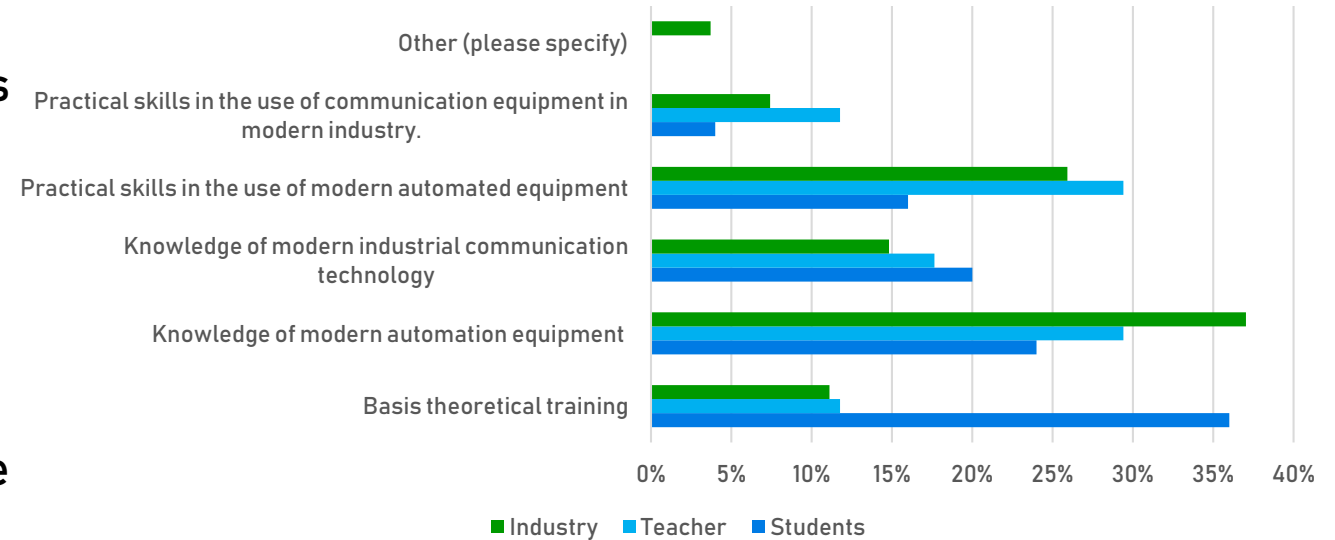


Current State Analysis

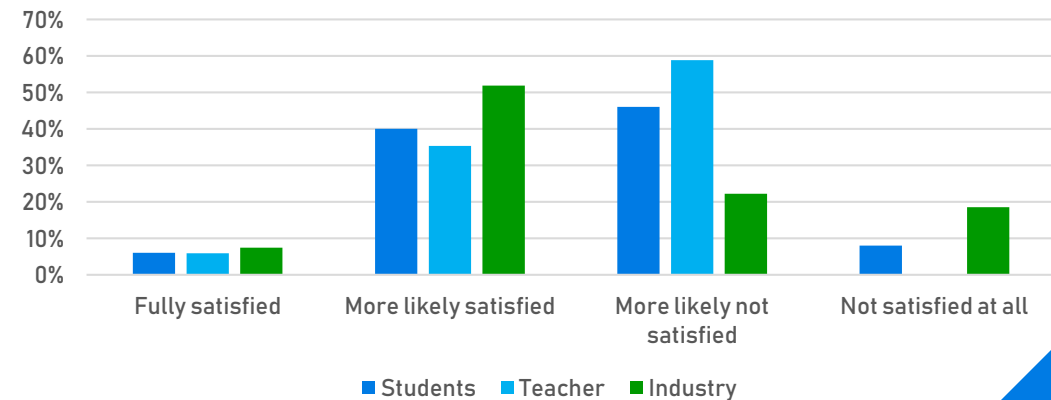
Satisfaction of qualification

- Professionals and teachers see critical problems in providing knowledge and practical skills in modern automation equipment
- The view of students is quite different as they see a problematic aspect in the provision of basic theoretical training and basic knowledge.
- Low to medium level of satisfaction regarding the current level of qualification of specialists in Automation 4.0.
- The majority of students and teachers are not very well satisfied with the training quality. The specialists from the industry, however, are largely satisfied with the qualification of their professionals in automation.

Problematic aspects in qualification



Satisfaction of qualification in Automation 4.0

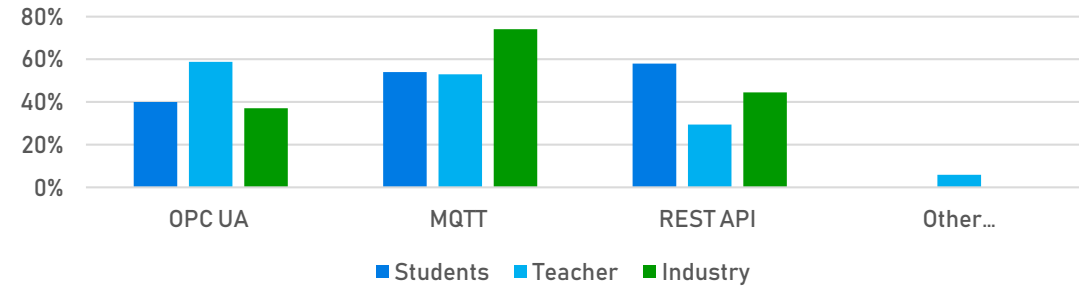


Technical needs analysis

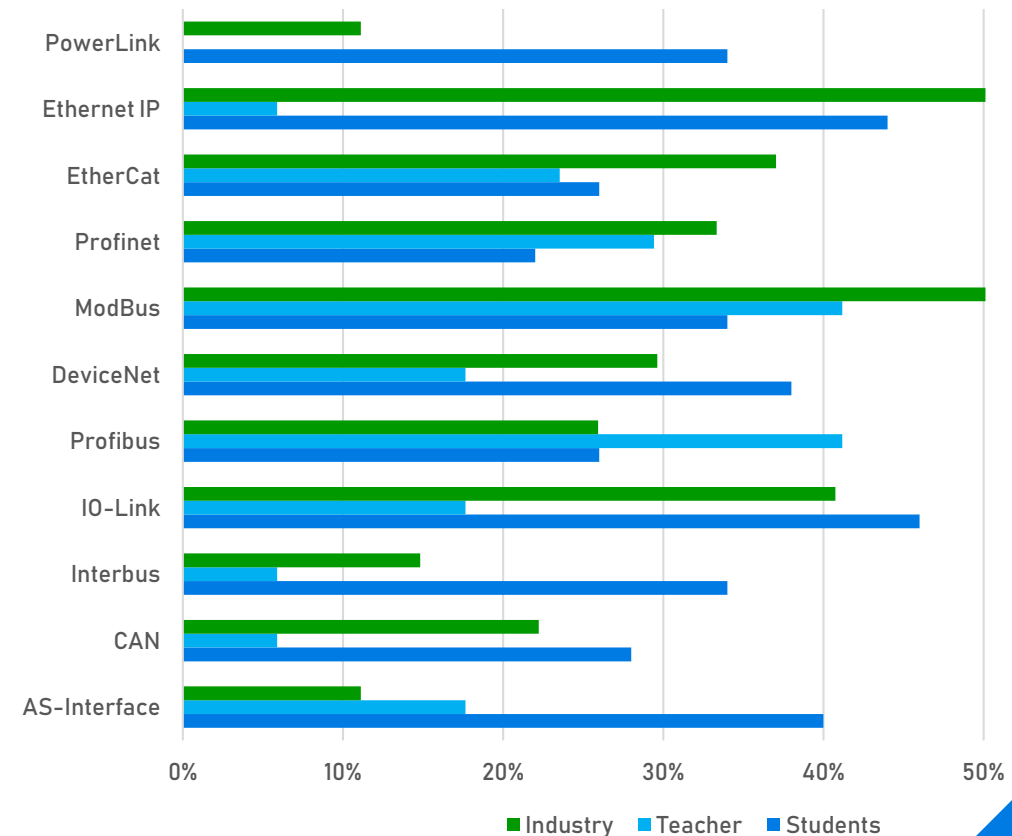
Communication technologies and protocols

- The most important IoT communication protocols for Thai industry is **MQTT**, while teacher opt for **OPC UA**. According to students **REST API** is the most important communication protocol.
- Based on the results of industry the most widespread ones are **Ethernet IP**, **ModBus** and **IO-Link**. According to teacher, they are Ethernet IP, Modbus and **Profibus**. Students opt for Ethernet IP as well and for **IO-Link** and **AS-Interface** or **DeviceNet**.
- All target groups agree that the most widespread is **Ethernet IP**.

Most important IoT communication protocols



Most widespread industrial telecommunication technologies

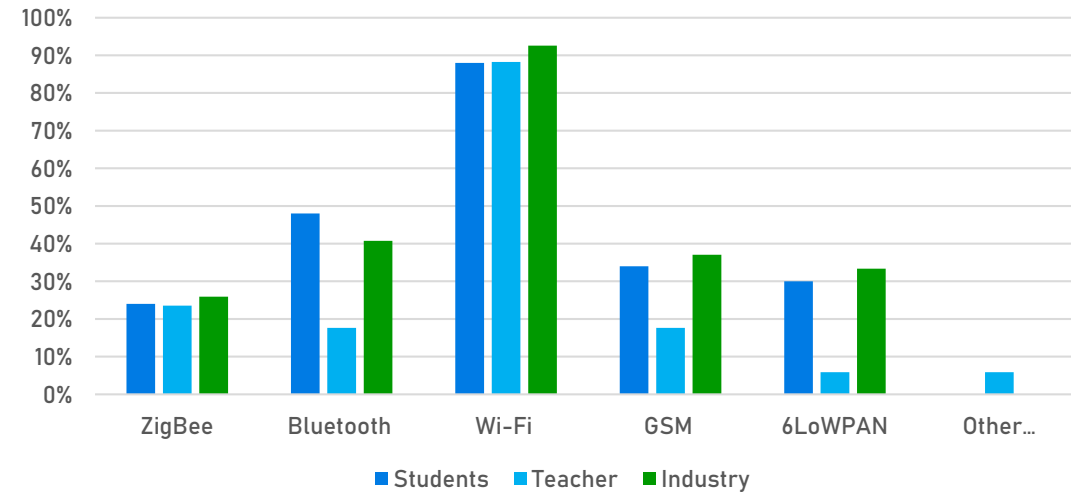


Technical needs analysis

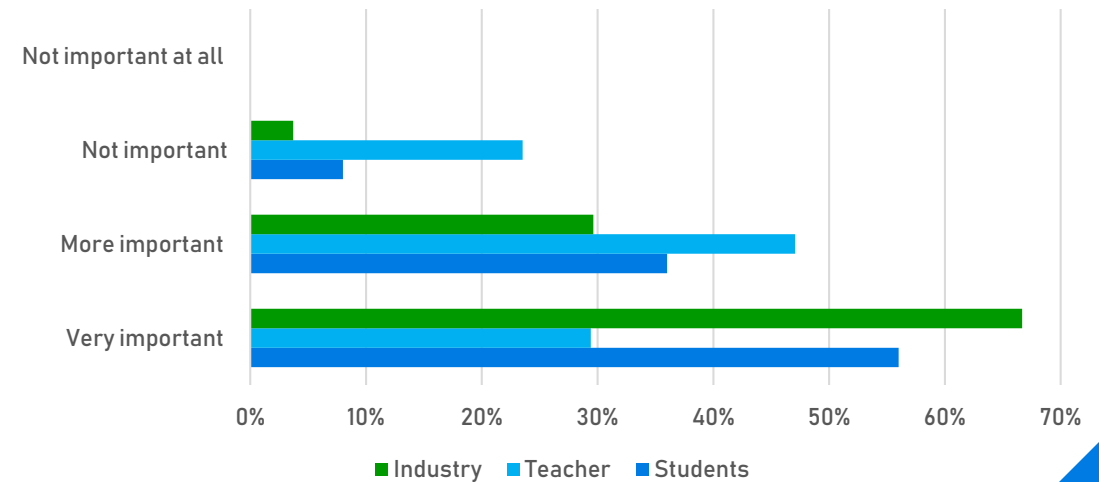
Wireless Technologies and selection of equipment

- All target groups agree that **Wi-Fi** is the most promising technology followed by **Bluetooth** and **GSM**.
- All target groups confirm that it is **important** that training materials are based on **specific manufacturers**.
- For industry and students, this aspect is of high relevance, while **teacher from university are more flexible** in the selection of manufacturers.
- Selection of equipment should also aim to **introduce newest, modern and advanced automation technologies from Europe to Thailand**.

Most promising wireless technologies



Importance of being based on specific manufacturers

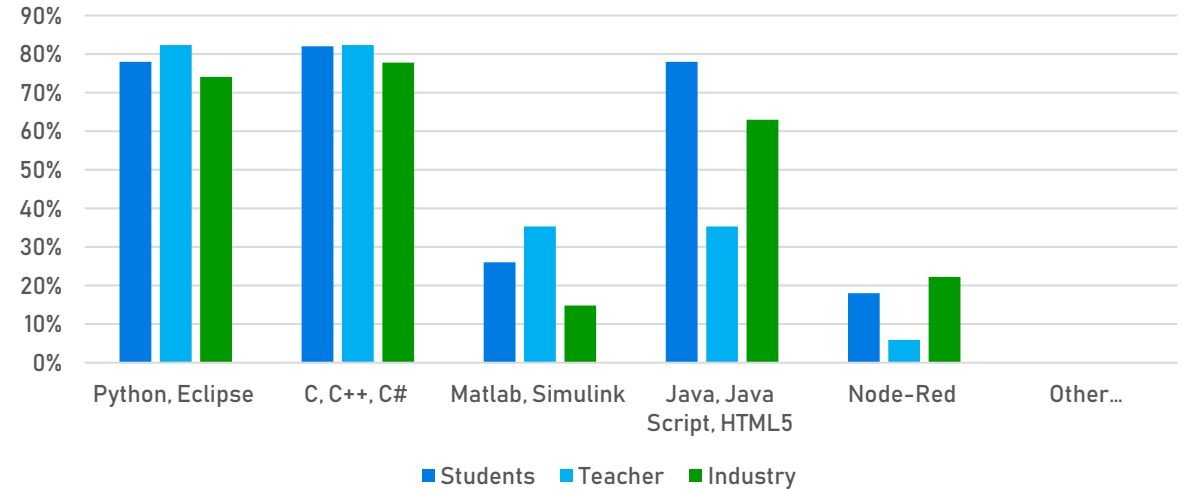


Technical needs analysis

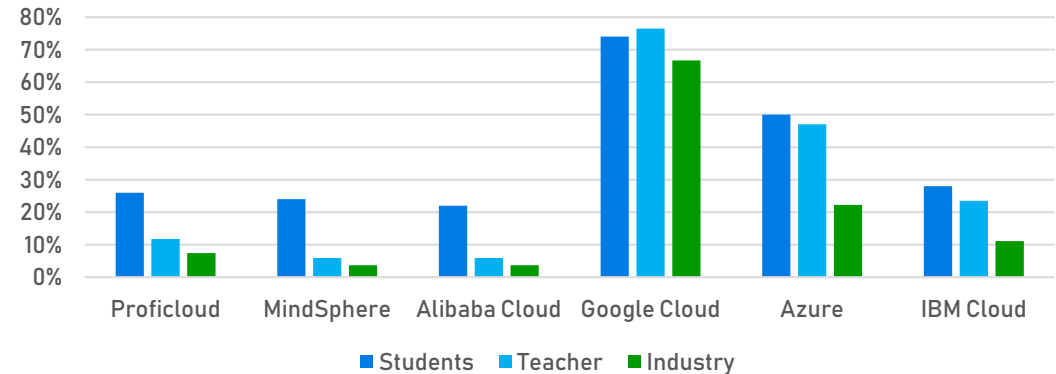
Programming language

- Students and professionals from industry find that **Python**, **C-programming** and **Java** are the most important programming languages for a future career as Automation 4.0 specialist.
- According to **teacher**, **Java** is less significant and positioned **equal to Matlab and Simulink**.
- According to all target groups **Google Cloud** is the most useful cloud system for the future career of specialists in Automation 4.0, followed by **Microsoft Azure** and **IBM Cloud**

Most important programming languages



Most useful cloud system

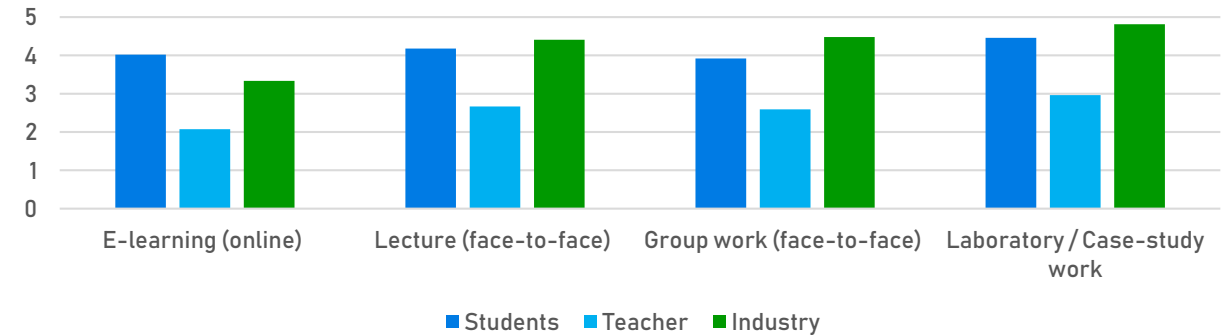


Needs analysis regarding teaching formats

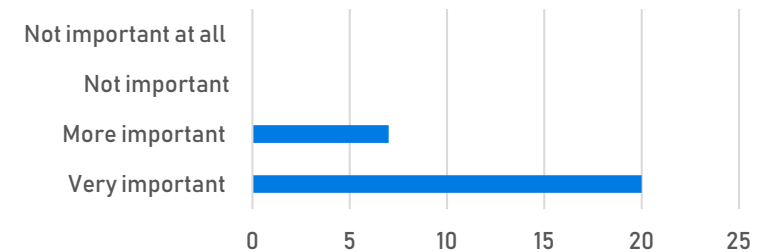
Learning methods and interest in courses for industry

- **Students** are in favour of **e-learning** formats,
- **Teacher** and **professionals** from industry seem to be **less convinced of e-learning**.
- All target groups confirm that **practical exercises** in laboratory and the conduction of **case study work** are promising learning methodologies.
- The **face-to-face lecture** is still one of the **most preferred formats for teaching**.
- **Interest of industry in training courses is high to very high**
- Nearly two third of them would be able to send **between 3 and 10 employees** to such courses. Some companies could send less and other companies also more than 10.

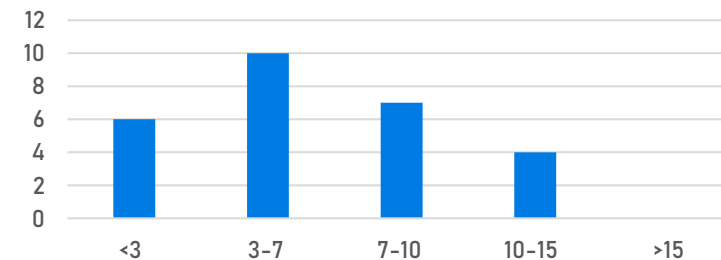
Preferred learning methods



Interest in courses for industry



#People that could attend courses

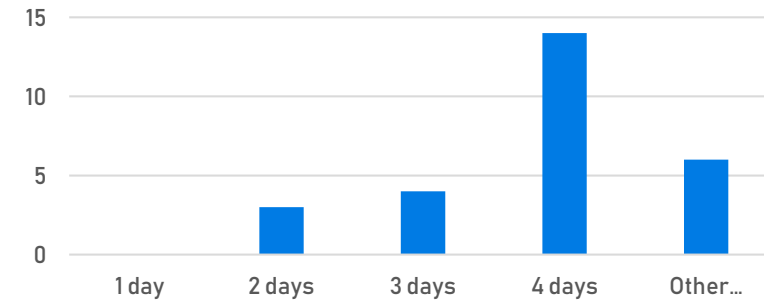


Needs analysis regarding teaching formats

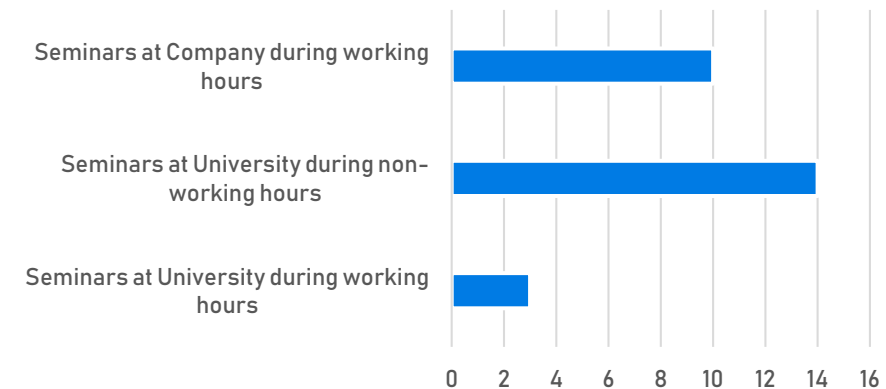
Learning format and duration

- Most of the companies are for a training with **at least 4 days of training** in order to get not only a superficial overview of Automation 4.0 and related technologies.
- Regarding the form of training most of the companies prefer to **send their employees to seminars at training centres in universities during non-working hours** as well as to seminars organized directly on site during working hours.

Appropriate length of training



Form of training



Conclusions for ETAT Hardware Definition Process

- Industry asks for providing **knowledge and practical skills in modern automation equipment**
- Equipment should strongly **support understand of theoretical knowledge**
- Equipment should support **MQTT** (industry view), **OPC UA** (teacher view) and **REST API** (students view)
- Equipment should support **Ethernet IP** and possibly **ModBus and IO-Link and Profibus.**
- Equipment should support **Wi-Fi** and possibly **Bluetooth and GSM**
- **Selection of manufacturers is important** and should aim to **transfer knowledge** of newest modern and **advanced technologies from Europe to Thailand**
- Students ask for for **IoT and PLC facilities** in labs
- Preferred applications: **robotic station, home automation, smart farming, assembly system**
- Equipment to be used for **analysis and design, HMI development, control programming, simulation and process control and industrial communication**



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Thank you for your attention!

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