Result O6

Digital entrepreneurship education

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Latvian Chamber of Commerce and Industry, Latvia

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Hungarian Association of Craftsmen Corporation, Hungary

Informatikai Tavkozlesi Elektronikai Vallalalkozasok Szovetsege Egyesulet, Hungary

Language

English

Contents

1. Introduction

Project Summary

Small and medium-sized enterprises (SMEs) in the construction sector urgently need to overcome the following challenges:

a) Fast, active and efficient shaping of digital transformation.

b) Comprehensive realization of cooperation across different organizations at all stages of the construction process.

c) Attracting the urgently needed, appropriately qualified next generation of skilled workers and entrepreneurs.

The demand for good apartments and houses has rarely been as high as it is now, and yet there is far too little affordable housing available. Hence, significant increases in efficiency and acceleration of construction planning and execution are much needed in the construction industry. Construction projects can be carried out more efficiently through the application of targeted digital tools. In fact, around 30% of planning capacities can be saved this way. In addition, digital technologies make the identification of risks in the construction possible at an early stage so that they can be avoided.

When building one- and two-family houses, up to 25% of the total construction costs go to coordination work, which can be reduced to a very large extent through self-coordination using digital tools. Since the construction industry is characterized by a highly specialized division of labor, coordination errors can quickly occur, which often result in inferior quality and delays. Furthermore, energy and environmental aspects are often not given enough attention during new constructions and reconstructions. With the help of digital technologies, building owners, architects, engineers and craftsmen can plan together easily, increase the quality and ensure the adherence to deadlines. Moreover, new technologies make it possible to determine the energy costs of a building at an early stage and to eliminate risks or hidden costs. Individual priorities can be placed on technical features or environmental aspects. Although digital technologies and tools are already being tested and used in practice, the overall digitalization in the construction sector is only advancing very slowly.

Compared to other countries (e.g. the Netherlands, Denmark or Finland), Germany has a lot of catching up to do. SMEs in the construction and finishing trades, which are very active in the construction of one, two and smaller multi-family houses are particularly hesitant when it comes to using new digital tools and are therefore the focus of the project. The shortage of skilled workers is particularly severe in the construction industry.

The attractiveness for vocational training and construction activities is clearly suffering from the high specialization, physically difficult work, heteronomy, etc. The targeted use of digital technologies can reverse these barriers and lead to decisive increases in attractiveness. Large companies and general contractors in the construction industry often use their own digital systems, which they impose on their SME subcontractors, making them dependent and completely transparent. This leads to the rejection of digitalization in SMEs. There is a lack of SME specific advisory and training programs on digitalization in the construction and finishing trades. Both the owners and the employees of the SMEs have a high need for information, advice and further training. Support capacities must be expanded, and teachers and consultants of SMEs must be prepared and

trained in a targeted manner in order to be able to convey SMEs and their employees the use of digital technologies. The SME-specific training courses should highlight the intersections and interdependencies between the various trades and actors through transparent interfaces, in order to promote the need for cooperation and the use of digital technologies.

The overall objectives of the project are:

1. To quickly and productively shape the digital transformation in small and medium-sized enterprises (SMEs) in the construction sector based on the needs and challenges they are facing, so that as many SMEs as possible use digital technologies and tools in all fields of activity in their company.

2. To facilitate easier cooperation through digital technologies between all those involved in the construction work (clients, architects, engineers and SMEs in the various trades) from planning to the execution, including the management of the construction of large-scale projects.

3. To increase the efficiency, quality and punctuality in the construction industry as well as the ability to include environmental and sustainability aspects in the planning, construction or renovation of buildings through the application of specific digital tools and technologies.

4. To increase the attractiveness of vocational training and work in the construction sector in order to meet the already very high and still growing demand for qualified skilled workers and entrepreneurs in this sector. In order to achieve these decisive objectives, the following action goals are pursued in the project.

a) Providing digital technologies and tools as well as cooperation methods suitable for SMEs in the construction industry by analyzing international best practices and adapting them to the different national conditions, which are then transferred to SMEs together with individual implementation advice.

b) Providing SME specific education programs on digital competences and skills by analyzing and adapting international best practices, which are then implemented by chambers with their educational institutions, vocational schools and other VET institutions.

c) Strengthening the educational and counselling capacities as well as the qualification of teachers and consultants of SMEs so that they can give sound advice on digital transformation and implement qualification programs.

d) Increasing the attractiveness of vocational training and winning qualified young people with strong learning ability for the construction sector by developing, testing, evaluating and implementing additional qualification trainings on digitalization in the construction sector, which are completed during or directly after vocational training and result in an independent, recognized vocational qualification.

e) Enabling architects, engineers and SMEs in the construction and finishing trades to realize comprehensive collaborations through the use of digital technologies by developing, testing, evaluating and implementing a training program on collaboration management and digital skills.

f) Enabling SMEs and their employees to make full use of digital technologies in all areas of construction by developing, testing, evaluating and implementing a training program on digital competences and skills.

g) Contributing to closing the entrepreneurship gap by attracting young entrepreneurs with digital competences and skills through the development, testing, evaluation and implementation of a module program for digital entrepreneurship training.

h) Increasing the attractiveness of vocational training and work in the construction sector by offering interesting, expanded areas of activities as well as qualifications with recognized degrees at all levels of vocational training with maximum permeability.

i) Strong regional dissemination of the implementations of the project results by transferring the results and demand-oriented implementation recommendations to 72 SMEs and education institutions from 13 countries.

About digital entrepreneurship education

The use of digital technologies is particularly low in SMEs in the construction and finishing sector. Entrepreneurs and managers do not have sufficient information, knowledge and skills for the use of digital technologies in their companies. In this respect, current entrepreneurs and managers in SMEs need to be comprehensively qualified and advised. However, training courses on digital technologies should also be integrated into existing specific training programs during the qualification of the next generation of entrepreneurs and managers and implemented intensively. The following activities were therefore carried out as part of the project:

- Development concept, curricula and teaching materials for different modules of a comprehensive digital entrepreneurship training for SMEs of the construction sector. The individual modules can be integrated into existing entrepreneurial training programs (e.g. training to become a master craftsman or technician or relevant degree programs) or carried out as separate further training courses.
- Development of examination regulations in order to be able to test the digital skills acquired and bundle them into a separate qualification.
- Testing the qualification modules under different national conditions.
- Development of an evaluation concept, evaluation of the trials and, based on the evaluation results, revision and finalization of curricula and teaching materials.

Output 6.0 Digital entrepreneurship education includes:

- Concept and curricula for the modules of a digital entrepreneurship education including a concept for the future use of the modules.
- Examination regulations.
- Implementation reports of the trials.
- Evaluation concept and report.

2. Concept and Curricula digital entrepreneurship education[1]

Introduction

There is a lack of entrepreneurship education on digitization in the construction and finishing trades. The Result is dedicated to digital entrepreneurship training in the construction and finishing trades. The Result includes concept, Curricula, teaching materials, etc. for a series of modules for digital entrepreneurship education in the construction and finishing trades. The program, which is fully in line with the EU Action Plan for digital education, builds on the European Digital Competence Framework (DIG COMP). The overall program consists of several modules that correspond to the DIG COMP structure and are assigned to levels 5 - 8. are assigned.

The education program

This course, based on the results of R1 "Best Practices digital technologies and trainings" is a higher-level education program. The education program, which fully complies with the EU Action Plan for digital education, builds on the European Digital Competence Framework (DIG COMP). The curricula are developed according to learning outcomes, which are classified at level 6 of the EQF. The individual modules comprise 60 - 80 teaching hours each and include:

a) different digital technologies and tools for all tasks of construction in SMEs and impart the corresponding digital corresponding digital competences and skills.
b) inter-company cooperation management and models of construction cooperation by means of digital technologies and impart cooperation skills and competences for the use of relevant digital tools.
c) In all modules, also the Best practice tools, methods, approaches, etc. (see Result 1) are included so that the technologies are taught and their application are trained. The modules are to be offered as elective Result Description (including: needs analysis, target groups, elements of innovation, expected impact and transferability potential) and compulsory modules in existing master craftsman and technician and relevant bachelor degree programs and be integrated and carried out on an ongoing basis.

Target groups

Target groups are Participants in master craftsman training programs in the construction and finishing trades, participants in construction technician training courses and students of relevant bachelor degree courses.

Main Impacts

Main impacts are:

a) It will train entrepreneurs for the construction and finishing trades, for different fields of working with digital technologies and are able to implement comprehensive cooperations in the construction sector.
b) Further education institutions, colleges and universities receive a tried-and-tested module program that can be integrated into existing training and study programs and used on a broad regional basis.
c) SMEs in the construction industry receive the urgently needed young entrepreneurs who have the digital skills and knowledge for all digital competencies and collaborative skills

[1] Compiled by Tamas Ferenczi (M.Sc.) and Andreas D. Weise (Prof. Dr.), Buxtehude University of Applied Sciences

for all cooperation skills for all areas of construction. The result is fully transferable for different countries and regions in the EU.

Methodology

The courses include individual university learning modules at level 6 of the EQF, that comprise 60 - 80 teaching hours each.

Study Modules and Course Contents

Mo-dul-code	Modulname	Study Courses		Examination	Study Content	Study Hours
BME	**Business Management & Economics**	EXA	Introduction Excel & Access	Written Exam and Homework	Excel und Access	80
		DBM	Digital Business Management	Homework and Written Exam	Process management, personal management, logistics, business planning, account management	80
		DFM	Digital Finance Management	Homework and Oral Exam	Finance management, cost-benefit analysis, invoice, annual balance calculation, annual report analysis	70
CAD	**Computer Aided Design**	CAD1	Computer Aided Design	Written Exam and Homework	CAD (AutoCAD, AllPlan, ArchiCAD, Solid Edge)	60
		CAD2	Computer Aided Design and Presentation	Written Exam and Homework	Building families in BIM, Visualisierung by Lumion	60
BIM	**Building Information Modeling**	BIM1	Building Information Modeling Projekt	Group Work and Oral Exam	Autodesk REVIT	60
		BIM2	Building Information Modeling 2	Written Exam and Homework	4D- /5D-BIM, model-based scheduling and cost planning with iTWO (RIB), MS Project	60
BDN	**Big Data & Networks**	BDM	Big Data Management	Oral Exam	Artificial intelligence and big data management, Virtual and Augmented Reality, Digital Twins	60
		CNT	Communication Networks and Technologies	Group Work and Oral Exam	Cloud solutions and mobile technologies, MS Teams, Zoom, Office, WhatsApp, Blockchain Network	70
DCM	**Digital Construction Methods**	CS Vielleicht IPOSZ	Construction Softwares	Oral Exam and Group Work	Working with PlanRadar, software-based defect management, construction documentation, reporting, acceptance, inventory, evidence preservation, due diligence, certification, task assignment, Nevaris Build, Apps for the Construction Site, Capmo	80

		DCT	Digital Construction Technologies	Written Exam, Homework	Robots on construction site, 3D Printing On Construction Site, Drones on the construction site, IoT – Internet of Things on site	80

Module contents and course qualifications in detail

Business Management & Economics

Modulcode	Modul Name	
BME	**Business Management & Economics**	

ECTS-Point	Learning Hours	Course Language
5 CP	Classroom-Study: 160 h; Self-Study: 70 h	german

Modul Leader	Recommended Pre-Studies	Course Requirements
	none	none

Study Term of Modul
3 Semesters

Courses	Included Study Courses	Course Lecturer	Course Hours
EXA	Introduction Excel & Access		80 LVS
DBM	Digital Business Management		80 LVS
DFM	Digital Finance Management		70 LVS

Requirements for earning Credit Points	
Exams	**Study Works**
EXA: Written Exam (45 min.)	EXA: Homework (ca. 20h)
DBM: Written Exam (90 min.)	DBM: Homeworks in different topics (ca. 20 h)
DFM: Oral Exam	DFM: Homeworks in different topics (ca. 40 h)

Lecture and Study Tools	Multimedia Tools
Presentations, Black Board Notes	Black Board Notes, PowerPoint-Presentations, Lecture Script, Seminar-guides, Working on own Laptop / PC (particularly Excel) & IT-LAB

Qualifications (Gained knowledge, skills, competence)
EXA: The students know the basics as well as the essential functionalities of a spreadsheet and a database program. DBM: After participating, the students have basic knowledge of the operational functional areas of corporate management, investment accounting, financing, cost and performance accounting, production, logistics, organization, human resources, marketing and sales as well as knowledge of the approaches and processes of cost and Performance management, investment management and financing. After successful participation, the students are able to independently relate their basic knowledge of business administration and their in-depth knowledge of cost and performance accounting, investment accounting and financing to typical job profiles in the construction and/or real estate industry. After participation, the students are able to apply their knowledge to relevant fields of application in the construction and real estate industry and to independently calculate costs and performance, calculation, investment calculation and financing.

DFM: After participation, the students have basic knowledge of the operational functional areas of corporate management, investment accounting, financing, cost and performance accounting, production, logistics, organization, human resources, marketing and sales as well as knowledge of the approaches and processes of cost and Performance accounting, investment accounting and financing.

After successful participation, the students are able to independently relate their basic knowledge of business administration and their in-depth knowledge of cost and performance accounting, investment accounting and financing to typical job profiles in the construction and/or real estate industry.

After participating, the students are able to apply their knowledge to relevant fields of application in the construction and real estate industry and to independently calculate costs and
performance calculation, investment calculation and financing.

Study Content

EXA: Introduction to spreadsheets (MS Excel) and the development and use of a database (MS Access) Introduction to spreadsheets (MS Excel) with programming (VBA, controls, user-defined functions, etc.) or development and use of a database (MS Access);

DBM: Introduction to digital business administration, i.e.

- Company management, production and logistics, organization and human resources, marketing and sales, demarcation: internal and external accounting, basics of bookkeeping and accounting, financial mathematical basics of investment calculation and financing
- Basics of cost and performance accounting
- Basics of investment calculation
- Basics of financing

DFM: digital cost and performance accounting, investment accounting, financing

- Basics of cost theory, cost type accounting, cost center accounting, cost unit accounting (on a full and partial cost basis), normal and planned cost accounting, cost accounting systems with a focus on single and multi-level contribution margin accounting, activity-based costing, machine hourly rate calculation, cost management - cost planning, modern budgeting approaches, project cost controlling, life cycle costing , Target Costing, Overhead Value Analysis
- Static investment methods, dynamic investment methods, visualization of financial implications,
- Investment planning, investment theory, methods of investment calculation under certainty and uncertainty, decisions in the event of uncertainty and game-theoretical approaches, present value calculations, economic useful life and optimal replacement time
- Forms of financing and capital costs, internal financing, external financing, self-financing, external financing, corporate financing, project-related financing measures, basics of
- Refinancing in interbank transactions

Links for Inspiration:

Introduction Excel & Access (EXA):

https://doi.org/10.1007/978-1-4842-6467-6

https://doi.org/10.1007/978-3-319-38867-0

https://doi.org/10.1007/978-1-4842-0529-7

https://doi.org/10.1007/978-1-4614-2050-7

https://doi.org/10.1007/978-1-4302-0580-7

https://www.youtube.com/watch?v=G05TrN7nt6k&list=PLoyECfvEFOjYYy54Wa9E83xycKilVMoHp

https://www.youtube.com/watch?v=ib58rF5lFuA&list=PLm8I8moAHiH2n5HC4ZXBgS-cBLjxW-Dreu

Digital Business Management (DBM):

Kollmann, T. (2019): E-Business. Grundlagen elektronischer Geschäftsprozesse in der Digitalen Wirtschaft, 7. Auflage, Wiesbaden. https://doi.org/10.1007/978-3-658-26143-6

Kollmann, T. (2001): Virtuelle Marktplätze: Grundlagen, Management, Fallstudie, München.

Kollmann, T. (2019): Digital Marketing: Grundlagen der Absatzpolitik in der Digitalen Wirtschaft, 3. Auflage, Stuttgart.

Kollmann, T. (2022): Digital Entrepreneurship: Grundlagen der Unternehmensgründung in der Digitalen Wirtschaft, 8. Aufl., Wiesbaden.

Vom Brocke, J., Mendling, J. (2018). Business Process Management Cases. Management for Professionals. Cham: Springer.

Back, A., Gronau, N., Tochtermann, K. (2012). Web 2.0 und Social Media in der Unternehmenspraxis. Grundlagen, Anwendungen und Methoden mit zahlreichen Fallstudien. München: Oldenbourg.

Turban, E., Whiteside, J., King, D., & Outland, J. (2017). Introduction to electronic commerce and social commerce. Cham: Springer.

Digital Business -Grundlagen von Geschäftsmodellen und -prozessen in der Digitalen Wirtschaft https://doi.org/10.1007/978-3-658-37069-5

Digital Entrepreneurship - Grundlagen der Unternehmensgründung in der Digitalen Wirtschaft https://doi.org/10.1007/978-3-658-37260-6

Digital Finance Management (DFM):

Tobias Kollmann (2019): E-Entrepreneurship https://doi.org/10.1007/978-3-658-27429-0

CPA Digital Finance Course

https://www.youtube.com/watch?v=HbNtzAQxOpw&list=PL7qYtUCV4faO-WET0wwezTIiP5CPoszXFT

John Soldatos, Dimosthenis Kyriazis (2022): Big Data and Artificial Intelligence in Digital Finance https://doi.org/10.1007/978-3-030-94590-9

Computer Aided Design

Modulcode	Modul Name	
CAD	**Computer Aided Design**	

ECTS-Points	Learning Hours	Course Language
6 CP	Classroom-Study: 60 h; Self-Study: 60 h	German

Modul Leader	Recommended Pre-Studies	Course Requirements
	none	none

Study Term of Modul
2 Semesters

Courses	Included Study Courses	Course Lecturer	Course Hours
CAD1	Computer Aided Design		60 LVS
CAD2	Computer Aided Design and Presentation		60 LVS

Requirements for earning Credit Points	
Exams	**Study Works**
CAD1: Written Exam (60 min.) CAD2: Oral Exam	CAD1: Homework (ca. 20h) CAD2: Group Work

Lecture and Study Tools	Multimedia Tools
Presentations, Black Board Notes, Group Work with supervisors, Visiting Construction Sites	Black Board Notes, PowerPoint-Presentations, Lecture Script, Seminar-guides, Working on own Laptop / PC & IT-LAB

Qualifications (Gained knowledge, skills, competence)
CAD1: After successful participation, the students know the essential functionalities of a CAD system as well as the essential surveying possibilities for solving surveying tasks. After successful participation, the students are able to master simple construction tasks with their CAD knowledge and to independently carry out measurements according to position and height using commonly used surveying devices and to solve simple surveying tasks mathematically. After successful participation, the students are able to apply basic working techniques in dealing with application programs to solve job-specific tasks, as well as to assess accuracy requirements for measurement tasks and to choose appropriate solutions to problems. CAD2: Knowledge of the application of computer-based systems for the representation of two- and three-dimensional projects; Development and use of intelligent components as a basis for BIM-supported multidimensional processes; Creation of individual component families; Basic knowledge of visualization of design projects. Understanding of the use of BIM-capable CAD software, preparation of constructional, two- and three-dimensional draft and detailed plans with the help of CAD software; Photo-realistic representation based on a three-dimensional CAD design. Skills for the visual representation of your own design ideas using the CAD and photorealism software you have learned; Development of a striking presentation of your own design ideas on a given format.
Study Content
CAD1: Introduction to the CAD system Revit. CAD2: Introduction to the basics of two- and three-dimensional representation with the help of a CAD program; Creation of a three-dimensional project from foundation to expansion with the help of a CAD program; Deriving 2D plans from the 3D model; Creation of parameterized component families; Introduction to the basics of photorealistic representation.

Links for Inspiration:

AutoCAD for Beginners – University Course

https://www.youtube.com/watch?v=VtLXKU1PpRU

Revit Courses

https://www.youtube.com/watch?v=3JNQh6hy-EXg&list=PL8evaQZnDGAdCKg7XzBVKhFa5kGL7Up5l
https://www.youtube.com/watch?v=lYjLcJ0QmuY&list=PL8evaQZnDGAcoihnQnYTW6pfFdGjxOigC

Building Information Modeling

Modulcode	Modul Name	
BIM	**Building Information Modeling**	

ECTS-Points	Learning Hours	Course Language
6 CP	Classroom-Study: 60 h; Self-Study: 60 h	German

Modul Leader	Recommended Pre-Studies	Course Requirements
	CAD	none

Study Term of Modul
2 Semesters

Courses	Included Study Courses	Course Lecturer	Course Hours
BIM1	Building Information Modeling Project		60 LVS
BIM2	Building Information Modeling 2		60 LVS

Requirements for earning Credit Points	
Exams	**Study Works**
BIM1: Oral Exam (30 min.)	BIM1: Working on a construction project in groups of two (processing time approx. 30 hours): Design and creation of a 3D BIM-capable architectural model using the Revit program. Transfer of the model to the formwork program Tekla. 3D further processing of the connections, formwork and reinforcement plans.
BIM2: Oral Exam (30 min.)	BIM2: Processing of a construction project in group work (scope approx. 30 hours): refinement of an architectural model from BIM1, transfer to the 4D/5D BIM program RIB iTWO and creation of a cost and schedule plan

Lecture and Study Tools	Multimedia Tools
PC work, blackboard work, group work under supervision	PPT presentations, blackboard writing, Working on own Laptop / PC & IT-LAB

Qualifications (Gained knowledge, skills, competence)
After successful participation, the students know the basics of the BIM planning method. After successful participation, the students are able to use the BIM planning method for the areas of architecture and structural engineering. After successful participation, the students are able to create simple BIM models and edit existing BIM models. After successful participation, the students know the basics of the BIM planning method. After successful participation, the students are able to use the BIM planning method for the areas of cost and schedule planning. After successful participation, the students are able to create simple BIM models and edit existing BIM models.

Study Content
BIM1: In the theoretical part, the BIM method is explained in relation to the topic. This covers about half of the lecture period. The part is supplemented by external lectures from construction planning offices on the current status of BIM application. In the practical part of the lecture, the application of the software packages Revit and Tekla is trained. Following on from this, the students set up their own BIM model in group work and carry out the planning steps required in practice. The planning of the BIM model must be documented in group work and hand it in as a study achievement. Cooperation with the WBI course is being sought. BIM2: Building on the BIM1 course, the theoretical knowledge of the BIM planning method is expanded to include the areas of 4D-BIM and 5D-BIM, i.e. cost and schedule planning based on BIM models. This is trained in practice using the RIB iTWO software package and on the basis of the building models already created in BIM1. The BIM models are sampled and refined in the sense of an implementation plan, specifications and cost estimates are created from the models according to DIN 276 and a schedule for the construction work is carried out on the basis of the models.

Links for Inspiration:

André Borrmann, Markus König, Christian Koch, Jakob Beetz (2021): Building Information Modeling https://doi.org/10.1007/978-3-658-33361-4

Hausknecht / Liebich; BIM-Kompendium – Building Information Modeling als neue Planungsmethode; Fraunhofer IRB; Stuttgart 20160

Günthner; Digitale Baustelle – innovativer Planen, effizienter Ausführen; Springer Verlag; Berlin 2011 https://doi.org/10.1007/978-3-642-16486-6

Gerhard Girmscheid, Christoph Motzka; Kalkulation und Controlling in der Bauwirtschaft; 2. Auflage; Springer-Verlag; 2013 https://doi.org/10.1007/978-3-642-36637-6

Klaus D. Siemon; Baukostenplanung und -steuerung bei Neu- und Umbauten; 7. Auflage; Springer Vieweg; Wiesbaden 2021 https://doi.org/10.1007/978-3-658-28460-2

Rolf Reppert, Effiziente Terminplanung von Bauprojekten: Schnelleinstieg für Architekten und Bauingenieure (essentials); Springer Vieweg; Wiesbaden 2016 https://doi.org/10.1007/978-3-658-13490-7

Big Data & Networks

Modulcode	Modul Name	
BDN	**Big Data & Networks**	

ECTS-Points	Learning Hours	Course Language
6 CP	Classroom-Study: 60 h; Self-Study: 70 h	German

Modul Leader	Recommended Pre-Studies	Course Requirements
		none

Study Term of Modul
2 Semesters

Courses	Included Study Courses	Course Lecturer	Course Hours
BDM	Big Data Management		60 LVS
CNT	Communication Networks and Technologies		70 LVS

Requirements for earning Credit Points	
Exams	**Study Works**
BDM: Oral Exam CNT: Oral Exam	BDM: Homework CNT: Group Work

Lecture and Study Tools	Multimedia Tools
Presentations, Black Board Notes, Group Work with supervisors, Visiting Construction Sites	Black Board Notes, PowerPoint-Presentations, Lecture Script, Seminar-guides, Working on own Laptop / PC & IT-LAB

Qualifications (Gained knowledge, skills, competence)

BDM: Making data-driven decisions to stay ahead of the curve is imperative to the success of any business. In this course, you will learn how to understand big data, user-driven events, data science techniques and machine learning and apply this in order to inform successful product feature development and strategic business solutions.

This course takes a practical approach to identify how you can recognise business problems, obtain data as the building blocks of problem-solving, and how to use data science techniques to help understand, build and validate possible solutions. You will be able to apply your learning immediately in the workplace, making proactive changes that secure strategic and financial success based on real data.

CNT: The course covers the principles and practice of computer networking and telecommunications with emphasis on the Internet. Starting with the transport layer, the course provides a detailed discussion of upper layer principles and protocols. In addition to well known protocols, recent developments in the area of multimedia communication (e.g. Quality of Service, Peer-to-Peer networking, IP-Telephony), will be examined thoroughly.

Study Content

BDM:

- Communication data-driven decisions with authority to key stakeholders
- Determination of the main components of Big Data, Data Science and Machine Learning and how they work in a practical web tech environment
- Data analysis, data cleansing and data visualisation for data-driven product development to resolve strategic business issues
- Interpreting what the tools are telling you in terms of data trends and how to modify your approach
- strategically apply a range of data tools and methods to analyse and resolve common business issues.
- Artificial intelligence and big data management, Virtual and Augmented Reality, Digital Twins

CNT:

- Introduction and reference model
- Transport Layer (Addressing, Connections, Flow Control, QoS)
- Transport Protocols (UDP, TCP, Ports)
- Application Layer (Function, Sessions, Data Representation, RPC)
- Application Layer Protocols (FTP, Telnet, NFS, AFS, DNS, ..)
- Electronic Mail (Basics and Principles, SMTP, POP3, ..)
- World Wide Web (History, HTTP, HTML)
- Peer-to-Peer Principles and Applications (File Sharing, Cloud solutions and mobile technologies, Blockchain

Network, Processing Sharing, Problems)

- Multimedia Communication (QoS, IntServ/RSVP, DiffServ, further QoS Concepts, RTP/RTSP, MS Teams, Zoom, Office, WhatsApp,)
- IP-Telephony (SIP & H.323)

Links for Inspiration:

Conceptual Data Modeling

https://www.youtube.com/watch?v=ObA0oLIbXQU&list=PLGp3V_OB-WvYZI4OwChuW4F96KmFAi--hz&index=1

Big Data Analytics

https://www.youtube.com/watch?v=I_ku0D4uQzQ&list=PLPIwNooIb9vi4f8tVkzLnr1tll6Pubbqh

Big Data Hadoop Full Course

https://www.youtube.com/watch?v=pqT4AgPuzZ0&list=PL6UwySlcwEYJ2hFuGIvr4VEHUAfl-GCNT

Big Data Management

https://doi.org/10.1007/978-3-319-45498-6

Big Data Management and Analytics

https://doi.org/10.1007/978-3-030-61627-4

Digital Communication Management. (2018).United Kingdom: IntechOpen.

Perspectives on Design and Digital Communication III

https://doi.org/10.1007/978-3-031-06809-6

Re-skilling Human Resources for Construction 4.0

https://doi.org/10.1007/978-3-030-85973-2

Advances in Design and Digital Communication

https://doi.org/10.1007/978-3-030-61671-7

Digital Construction Methods

Modulcode	Modul Name	
DCM	Digital Construction Methods	

ECTS-Points	Learning Hours	Course Language
6 CP	Classroom-Study: 80 h; Self-Study: 80 h	German

Modul Leader	Recommended Pre-Studies	Course Requirements
		none

Study Term of Modul
2 Semesters

Courses	Included Study Courses	Course Lecturer	Course Hours
CS	Construction Softwares		80 LVS
DCT	Digital Construction Technologies		80 LVS

Requirements for earning Credit Points	
Exams	**Study Works**
CS: Oral Exam DCT: Written Exam (90 min.)	CS: Group Work DCT: Homework

Lecture and Study Tools	Multimedia Tools
Presentations, Black Board Notes, Group Work with supervisors, Visiting Construction Sites	Black Board Notes, PowerPoint-Presentations, Lecture Script, Seminar-guides, Working on own Laptop / PC (particularly Excel) & IT-LAB

Qualifications (Gained knowledge, skills, competence)

CS: Safe handling and working with possible Software solutions to better organise Construction Site an Construction Prozesses such as: complete documentation, cooperation between SMEs on construction site, failure Management.

DCT: Digital Construction is futuristic technology, by using the technologies we can reduce the Construction Cost, Time with better Quality & Safety. Large Companies are adopting Digital Construction using Building Information Modelling.

Study Content

CS: In this course, you will be learning about:
- software-based defect management,
- construction documentation, reporting, acceptance, inventory,
- evidence preservation, due diligence, certification, task assignment,
- Working with Apps on the Construction Site such as: PlanRadar, Capmo, Nevaris Build,

DCT: In this course, you will be learning about:
- Robots on construction site,
- 3D printing in construction
- Drones usage in Construction
- Augmented Reality & Virtual realty
- Modular Construction
- IoT – Internet of Things in the Construction field

Links for Inspiration:

CAPMO Case Studies
https://www.capmo.com/en/referenzen

PlanRadar
https://www.planradar.com/customer-stories/

Nevaris Build
https://exalate.com/case-studies/nevaris/

Tools & Handbooks
https://drive.google.com/drive/folders/1-MixUJ-_HyVqwkavQSdTl0llyJ0DkOIi?usp=sharing

Notes for the lecturers

Each lecturer should adjust this to the circumstances of his own country, considering the local regulation the level and skills of the trainees, and the study program of the students. Each program may require different weightings and highlights, and it is on the responsibility of each lecturer to consider these special needs.

Work required

In the curriculum, the average work required by each module is measured in working hours. The work load must load to the European Credit Points Standard (ECTS).

Teaching methods

Lecturers are encouraged to use varying methods containing e.g.:

- Lectures,
- Visiting lecturers,
- On-line studies,
- Discussions
- Videos approaching the topics (Reliability of the source must be evaluated),
- Individual studies including learning tasks, and
- Assignments.

Cooperation with the local experienced industry practitioners is highly recommended. The good team spirit is important for creating an atmosphere of trust, and via this to enable sharing of knowledge and experiences that is an important part of creating a common knowledgebase.

Contents of the curriculum

The variation in regulations and circumstances and qualification requirements are quite different in the BSR-countries, thus the material was written only as a form of framework inside which the local actors should modify the contents of modules according to their own regulations and local requirements, without forgetting the needs of different study programs. By using innovative, problem-based, and experiential educational approaches, lecturers will be able to support students to create an atmosphere that enables to share knowledge and experiences, and to learn, how to co-operate with the help of digital solutions at construction sites.

The overall objectives of the curriculum are

- The student deepens his/her knowledge about underlying basic information concerning digital solutions supporting working processes in the construction and finishing business.

- The student understands the regulatory and theoretic framework behind the working processes.
- The student can implement and run working processes in a digital way.
- The student reports the results of the project (and self-learning tasks if used) and reflects the successes and failures evaluating the process and his/her own role.
- The student deepens his/her knowledge about common digital tools and their usability in the context of construction business.

The curriculum is divided into 5 Modules. Modules can be passed in any order and are independent from each other.

Notes on using the digital entrepreneur training modules

The use of digital technologies is particularly low in SMEs in the construction and finishing sector. Entrepreneurs and managers do not have sufficient information, knowledge and skills for the use of digital technologies in their companies. In this respect, current entrepreneurs and managers in SMEs need to be comprehensively qualified and advised. However, training courses on digital technologies should also be integrated into existing specific training programs during the qualification of the next generation of entrepreneurs and managers and implemented intensively.

Target groups A are people who are undergoing training and further education to become entrepreneurs or managers in SMEs. In this context, they should acquire comprehensive skills in the use of digital technologies. To this end, all digital entrepreneurship training modules should be integrated and offered as compulsory or optional modules in existing initial and continuing training programs, for example in

- the vocational master craftsman training programs (EQF Level 6).
- the training programs for technicians (EQF Level 6).
- Bachelor's degree programs (EQF Level 6).

The completion of the individual modules will be examined separately on the basis of internal regulations (see Chapter 3.), so that the graduates receive, in addition to the regular, recognized master, construction technician or bachelor's degree, a separate qualified certificate of attendance with the examination results.

Target groups B are (older) entrepreneurs and managers who already work in SMEs. They should complete the modules of the digital entrepreneur training program as further training. The individual modules can be completed either full-time or part-time on evenings and weekends (Friday and Saturday). Depending on their specific needs, participants select the modules that they consider most important. However, they should complete all modules within a medium-term period if possible. In order to achieve a sufficient number of participants, these further training courses can be organized together with the qualifications for target group A. This also promotes the exchange of experience and knowledge transfer between younger and older entrepreneurs and managers.

It is recommended that the individual modules of the further training programs are also completed with an internal examination (see Chapter 3). Successful completion of the examination for all modules can be bundled into an official, recognized further training qualification.

3. Examination Regulations

The completion of the individual modules can examined separately on the basis of internal regulations, so that the graduates receive, in addition to the regular, recognized master, construction technician or bachelor's degree, a separate qualified certificate of attendance with the examination results.

Examination Regulations for Continuing Education "Digital and collaborative entrepreneurship in construction sector"

1. Target groups of the continuing education "Digital and collaborative entrepreneurship" are future entrepreneurs, managers or specialists in the construction industry who complete this further training during or after completing their training as a professional master craftsman, technician or engineer.

2. Participants who complete all modules of the continuing education program "Training in digital and collaborative entrepreneurship" can take an additional examination on the basis of the present internal regulations, so that the graduates receive a separate qualified certificate of participation in addition to the regular, recognized master craftsman, construction technician or bachelor's degree.

3. The examination must determine whether the candidate
   a) has the necessary knowledge of digital technologies and cooperation in small and medium-sized enterprises in the construction and finishing industry.
   b) has the competences, skills and experience for the proper use of digital construction technologies and cooperation models and procedures.

4. There are no admission requirements for the examination. Anyone who completes the further training " Training in digital and collaborative entrepreneurship" can take part in the examination, for this purpose a separate registration by the participants is required.

5. The examination consists of two parts:
   5.1 First part: Case studies
   a) For a case study with problems and tasks from the medium-sized construction and finishing industry, the examinee should develop solutions through the use of digital technologies and/or the realization of construction cooperations and show steps for realization.
   b) The case study is determined by the examination board and handed over to the examinee in written form.

c) The examinee should propose solutions in a maximum of 75 minutes.
d) The candidate should present his proposed solutions orally to the examination board in a maximum of 15 minutes. The examination board can then ask questions and discuss their solutions with the examinee. If possible, these discussions should not exceed 30 minutes.

5.2 Second part: expert discussion

a) The examination board conducts a technical discussion with the examinee. The expert discussion can be conducted with up to three examinees at the same time, it should not exceed one hour if possible.

b) The expert discussion concerns the selection, use and evaluation of digital technologies and cooperation in the construction and finishing industry, including in particular the following topics:

- Managing the digital transformation in SMEs in the construction sector
- Knowledge and good understanding of data-intensive technologies such as artificial intelligence
- Communication and cooperation skills: interaction, exchange, commitment and collaboration using digital technologies
- Internal and inter-company cooperation management and models of construction cooperation using digital technologies as well as communication of cooperation skills and competencies for the use of relevant digital tools
- Fields of action for the use of cooperation models and tools as well as digital construction technologies in SMEs
- Efficient planning and development of digital capacities and collaborations, including corresponding organizational skills
- Problem-solving capacities, identification of needs, creative use of digital technologies and construction cooperations as well as identification of digital skills gaps
- Interaction, exchange, engagement and collaboration using digital technologies
- Use of cooperation models and digital construction technologies in operation
- Advantages and disadvantages in the realization of cooperations and the use of digital construction technologies
- Measures to check the suitability of cooperation models and tools as well as digital construction technologies in operation

6. The audit performance is evaluated by the Examination Board as follows:

- Passed with distinction
- Overgrown
- Failed

The examination result is communicated to the examinees in writing.

7. An examination that has not been passed can be repeated once at the request of the examinee within three months of receipt of the examination result.

8. All participants in the continuing education program "Training in Digital Entrepreneurship" receive a qualified certificate of participation; the participants who have passed and passed an exam with the additional note of the exam result (see attached samples).

Sample A: qualified certificate of participation

Logo and name of implementing institution

Confirmation of attendance

Name of the participant

Name of the company

took part in the advanced training with the topic

Training in digital & collaborative entrepreneurship

The advanced training program was carried out from *(date)* – *(date)* in *(city, country)*. It consisted of XY training parts, in which the following contents were imparted, knowledge deepened and applied in practice:

Part I: XY hours
- Modul A: .....
- .....

Part II: XY hours
- Modul A: .....
- .....

Part III: XY hours
- Modul A: .....
- .....

Part XY:.....

.....Place, Date.....

Signature
Name +
Implementing institution

Sinature
Name +
Implementing teacher

Sample B: qualified certificate of participation

Logo and name of implementing institution

Confirmation of attendance

Name of the participant

Name of the company

took part in the advanced training with the topic

Training in digital & collaborative entrepreneurship

The advanced training program was carried out from *(date)* – *(date)* in *(city, country)*. It consisted of XY training parts, in which the following contents were imparted, knowledge deepened and applied in practice:

Part I: XY hours
- Modul A: .....
- .....

Part II: XY hours
- Modul A: .....
- .....

Part III: XY hours
- Modul A: .....
- .....

Part XY:.....

As part of a final examination, practical case studies were developed and assessed, and comprehensive technical discussions were held on the various topics of digital construction technologies and construction cooperations. The examination was passed with *distinction/good*.

.....Place, Date.....

Signature
Name +
Implementing institution

Sinature
Name + Chairman
Audit Committee

4. Implementation Reports

Testing of Study Modules in Germany[2]

Introduction

Efficient construction through digital technologies in the construction and finishing trade begins in university classrooms and other educational institutions where digital training takes place. The construction industry urgently needs significant efficiency gains and faster project execution through digital technologies. Targeted digital tools can greatly enhance the efficiency of construction projects, but their benefits can only be fully realized if students and entrepreneurs in the field receive early and comprehensive training. Therefore, high-level educational training modules (EQF 6) are essential to drive digitalization forward in the construction and finishing industries.

As part of working product 6 of this research project, a curriculum for digital entrepreneurship education was developed and several modules and study courses were tested at the University of Applied Sciences in Buxtehude. The students in Buxtehude follow a dual system, simultaneously employed by companies in the construction and finishing industries. These full-time students alternate between theory and practical phases each term, allowing them to apply the knowledge gained at university almost immediately in small and medium-sized enterprises, often directly on construction sites.

The implementation of WP6 covered three modules with 4 study courses at the university in Buxtehude:

1. Module: Business Management & Economics (BME):

a. Study Course: Introduction Excel & Access (EXA)

- Implementation Period: 18.9. – 18.12.2023
- 12 Weeks of university study course
- about 80 learning hours, theory lectures and practical seminars
- Study content: working with excel and access, treating large data basis
- Homework and written exam

b. Study Course: Digital Finance Management (DFM)

- Implementation Period: 18.9. – 18.12.2023
- 12 Weeks of university study course
- For students employed by small construction engineering companies and general contractors participated
- about 80 learning hours, theory lectures and practical seminars
- Study content: Finance management, cost-benefit analysis, invoice, annual balance calculation, annual report analysis
- Homework (assignment) and oral exam

2 Module: Computer Aided Design (CAD):

[2] Prepared by Tamas Ferenczi, Buxtehude University of applied Sciences

Study Course: Computer Aided Design and Presentation (CAD2)

- Implementation Period: 18.9. – 18.12.2023
- 12 Weeks of university study course
- for students employed by architectural offices
- 60 learning hours, theory lectures and practical seminars
- Study Content: Working with AutoCAD, 3D Design, Building families in CAD, Visualization by Lumion
- Homework and Colloquium (Presentation of Homework)

3 Module: Building Information Modelling (BIM):

Study Course: Building Information Modeling Projekt (BIM1)

- Implementation Period: 18.9. – 18.12.2023
- 12 Weeks of university study course
- for students of structural engineering and architectural offices
- 60 learning hours, theory lectures and practical seminars
- Course took place in the BIM-LAB of the University
- Study Content: Working with Autodesk REVIT
- Group Work and Colloquium (Presentation of Group Work)

These courses train dual students, employed by companies in the construction sector, in the construction and finishing trades, focusing on various fields of digital technology. This enables them to implement advanced technologies in the sector. Through these study modules, SMEs in the construction industry gain access to young entrepreneurs equipped with essential digital skills, comprehensive knowledge, and the collaborative abilities needed across all areas of construction. The results are fully transferable to different countries and regions within the EU.

Admission and organisation of the training

The University of Applied Sciences in Buxtehude aimed to organize courses for dual students pursuing their bachelor's degrees at EQF Level 6, who are simultaneously employed by small and medium-sized companies in the construction and finishing trade. Thanks to the university’s strong connections with the Chamber of Crafts in Lower Saxony, additional chamber members were often invited to participate in specific courses. However, the majority of participants were dual students.

The courses were conducted during the winter terms of 2023 and 2024, spanning a 13-week learning period. Typically, students attended one lecture and one seminar per week, complemented by homework assignments and group projects that required the use of digital tools.

Lecturers are predominantly PhD-level professors employed by the university. They possess extensive expertise in construction and finishing trades, along with many years of professional experience in the industry.

Recognizing the growing importance of Building Information Modeling (BIM) in the construction sector, the university established a state-of-the-art BIM Laboratory (BIM Lab)

several years ago. This modern facility serves as a hub for digital education and technological advancements in the construction industry and is also available for research purposes.

The BIM Lab is equipped with numerous high-performance computer workstations, each featuring BIM-specific software (e.g., for modeling) and various multimedia technologies. Among other tools, it includes two 86-inch touchscreens, video conferencing technology, and, in the future, capabilities for VR and AR applications. With its advanced IT infrastructure, the lab provides optimal conditions for research and serves as a venue for workshops tailored to both BIM professionals and newcomers.

The BIM Lab's primary objective is to bring together key stakeholders throughout a building's lifecycle, fostering collaboration and hands-on exploration of the BIM methodology. Effective information exchange across disciplines and trades is crucial for the successful implementation of BIM. The BIM Lab serves as an ideal environment for knowledge development and transfer across all sectors of the construction industry.

Participants profile and organisation of the training

The participants in Buxtehude were between 19 and 30 years old, representing both genders. Most had either completed their matriculation exam or undergone vocational education and training. They were full-time dual students, employed by companies in the construction sector, including civil engineering firms, the public sector, general contractors, and architectural offices. A total of 363 students took part in the tests.

Execution of the Training

All the courses included theoretical lectures and practical seminars in which the knowledge gained in theory could be applied.

Introduction Excel & Access (EXA):

Study Content: Introduction to spreadsheets (MS Excel) and the development and use of a database (MS Access) Introduction to spreadsheets (MS Excel) with programming (VBA, controls, user-defined functions, etc.) or development and use of a database (MS Access)

Lecture and Study Tools: Presentations, Black Board Notes, PowerPoint-Presentations, Lecture Script, Seminar-guides, Working on own Laptop / PC (particularly Excel) & IT-LAB

Qualifications (Gained knowledge, skills, competence): The students know the basics as well as the essential functionalities of a spreadsheet and a database program.

Digital Finance Management (DFM):

Study Content: digital cost and performance accounting, investment accounting, financing

- Basics of cost theory, cost type accounting, cost center accounting, cost unit accounting (on a full and partial cost basis), normal and planned cost accounting, cost accounting systems with a focus on single and multi-level contribution margin accounting, activity-based costing, machine hourly rate calculation, cost

management - cost planning, modern budgeting approaches, project cost controlling, life cycle costing , Target Costing, Overhead Value Analysis
- Static investment methods, dynamic investment methods, visualization of financial implications,
- Investment planning, investment theory, methods of investment calculation under certainty and uncertainty, decisions in the event of uncertainty and game-theoretical approaches, present value calculations, economic useful life and optimal replacement time
- Forms of financing and capital costs, internal financing, external financing, self-financing, external financing, corporate financing, project-related financing measures, basics of
- Refinancing in interbank transactions

Lecture and Study Tools: PowerPoint-Presentations, Seminar-guides, Working on own Laptop / PC

Qualifications (Gained knowledge, skills, competence): After participation, the students have basic knowledge of the operational functional areas of corporate management, investment accounting, financing, cost and performance accounting, production, logistics, organization, human resources, marketing and sales as well as knowledge of the approaches and processes of cost and Performance accounting, investment accounting and financing.

Computer Aided Design and Presentation (CAD2):

Study Content: Introduction to the basics of two- and three-dimensional representation with the help of a CAD program; Creation of a three-dimensional project from foundation to expansion with the help of a CAD program; Deriving 2D plans from the 3D model; Creation of parameterized component families; Introduction to the basics of photorealistic representation.

Lecture and Study Tools: PowerPoint-Presentations, Black Board Notes, Group Work with supervisors, Lecture Script, Seminar-guides, Working in BIM-LAB

Qualifications (Gained knowledge, skills, competence): Knowledge of the application of computer-based systems for the representation of two- and three-dimensional projects; Development and use of intelligent components as a basis for BIM-supported multidimensional processes; Creation of individual component families; Basic knowledge of visualization of design projects. Understanding of the use of BIM-capable CAD software, preparation of construction, two- and three-dimensional draft and detailed plans with the help of CAD software; Photo-realistic representation based on a three-dimensional CAD design.

Skills for the visual representation of your own design ideas using the CAD and photorealism software you have learned; development of a striking presentation of your own design ideas on a given format.

Building Information Modeling Projekt (BIM1)

Study Content: In the theoretical part, the BIM method is explained in relation to the topic. This covers about half of the lecture period. The part is supplemented by external lectures from construction planning offices on the current status of BIM application. In the practical part of the lecture, the application of the software packages Revit and Tekla is trained. Following on from this, the students set up their own BIM model in group work and carry out the planning steps required in practice. The planning of the BIM model must be documented in group work and hand it in as a study achievement. Cooperation with the WBI course is being thought.

Lecture and Study Tools: PC work, blackboard work, group work under supervision, PPT presentations, blackboard writing, Working on own Laptop / PC & IT-LAB

Qualifications (Gained knowledge, skills, competence): After successful participation, the students know the basics of the BIM planning method. After successful participation, the students are able to use the BIM planning method for the areas of architecture and structural engineering. After successful participation, the students are able to create simple BIM models and edit existing BIM models.

Strengths of the courses: In common the lecturer dealt with important topics, and she was professional in the branch. She met the expectations of the students, and the topics were up-to-date of the students perspective. The lecturers have always helped if questions have come up and have much experience in the field of CAD & BIM.

Weaknesses of the courses: Questions and tasks should be more clearly structured, and also providing some tutorial videos would be helpful, in case some participants want to repeat the topics dealt in the class. Some students would need more interaction with the lecturer.

Main Findings and Conclusions

Introduction Excel & Access (EXA):

The evaluation survey was delivered by 47 students who participated in the course. Almost every student was younger than 30, 1 participant was between 30 and 60 years old. In terms of gender representation, males dominated the sample with proportion of 57%, while females comprised the remaining portion, 43%. Regarding employment status, all students were employed and working at a company, while studying on the university as full-time students in dual education. Overall, the feedback on facilitations reveals a generally positive perception among students, with a majority rating various aspects as “suitable”. Students positively assessed the place, the length, and the schedule of the training as well as the facilitations such as room and equipment.

Most of the tasks were self-explanatory even if someone did not have much experience. Providing some tutorial videos would be helpful, in case someone wants to repeat the topics dealt with in the class.

In summary, students generally expressed their satisfaction with the course, positively evaluated their own learning experience. In common the lecturer dealt with important topics, was professional in her branch, met the expectations, were up to date.

The study course will be continued for dual students in the future.

Digital Finance Management (DFM):

The evaluation survey was conducted by 7 students who participated in the course. All students were younger than 30. In terms of gender representation, females dominated the sample with proportion of 71%, while males comprised the remaining portion, 29%. All students were full time students matriculated at the university.

Exam times should be adjusted. Due to the structure of the exam, it was difficult to properly present the required content in written form within the given timeframe.

In summary, students generally expressed a high level of satisfaction with the course, positively evaluating their own learning experience. The few negative reviews can be attributed to the fact that the level of education and workload at the university are relatively high and demanding. The students were challenged to learn the material thoroughly before the exam.

The study course will be continued for dual students in the future.

Computer Aided Design and Presentation (CAD2):

The evaluation survey was conducted by 33 students who participated in the course. All the students were younger than 30 years old. In terms of gender representation, females dominated the sample with proportion of 58%, while males comprised the remaining portion, 42%. Regarding employment status, all students were employed and working at a company., as full-time dual students in architecture. Overall, the feedback on facilitations reveals a generally positive perception among students, with a majority rating various aspects as “suitable”. Students positively assessed the place, the length, and the schedule of the training as well as the facilitations such as room and equipment.

Several students said: Some of the information was very down-to-basic. Good for beginners, but less informative and somewhat unnecessary for anyone with even a little bit of experience. The lectures were very good, but it could be more intensive and interactive. The lecturer has always helped if questions have come up and had much experience in the field of BIM software’s.

In summary, students generally expressed a high level of satisfaction with the course, positively evaluating their own learning experience. Participants have learned work with Computer Aided Design. In common, the lecturers used interesting and motivating methods, dealt with important topics, were professionals in their branch, and met the expectations.

The study course will be continued for dual students in the future.

Building Information Modeling Projekt (BIM1)

The evaluation survey was responded to by 6 students who participated in the course. All the students were younger than 30 years old. Regarding employment status, all students are full time students in the dual study system, so they are studying and working at different companies during their years on the university. Overall, the feedback on facilitations reveals a generally positive perception among students, with a majority rating various

aspects as “suitable”. Students positively assessed the place, the length, and the schedule of the training as well as the facilitations such as room and equipment.

The students wish a bit more external practical examples and case studies and sometimes more guides for software’s. Also, some students think that more time should be provided for learning how to apply all the Methods presented and intensive lectures of theory should not have such a big part.

In summary, students generally expressed a high level of satisfaction with the course, positively evaluating their own learning experience. Participants have learned to work with Building Information Modelling. In common, the lecturers dealt with important topics, were professionals in their branch, met the expectations, and were up to date.

The study course will be continued for dual students in the future.

Testing digital entrepreneurship education in Latvia[3]

Introduction

The demand for good apartments and houses has rarely been as high as it is now, and yet there is far too little affordable housing available. Hence, significant increases in efficiency and acceleration of construction planning and execution are much needed in the construction industry. Construction projects can be carried out more efficiently by applying targeted digital tools. In addition, digital technologies make the identification of risks in construction possible at an early stage so that they can be avoided.

Within the project, best practices on the digital tools and training programmes that are used in the construction sector were researched, as well as different training programmes were developed. The training programme Digital entrepreneurship education combined several topic which are practical and useful, and is separated in different modules. The specific training module which was selected for this pilot was Business Management & Economics.

The trainings were carried out total in six sessions (14.09.2024, 28.09.2024, 12.10.2024, 26.10.2024, 02.11.2024 and 09.11.2024). Each session included theoretical information as well as some discussions and practical tasks. The last day was dedicated for a group activity and feedback session.

The training content was adjusted for the participants’ needs, allowing to ensure the best approach. At the end of the training, participants were asked to complete the evaluation survey, in order to understand the quality of the content, delivery, as well as the organisation of the training.

The training expert Mrs Ieva Bruksle added: “Business management and economics, especially with digital solutions, are essential for companies because they help make smarter decisions, save time, and improve efficiency. Digital tools allow better tracking of finances, managing teams, and understanding markets. This leads to growth, cost savings, and staying ahead of competitors in a fast-changing world. It is also important to educate

[3] Prepared by Jurijs Dubatovka, Latvian Chamber of Commerce and Industry, Riga

people on these topics so they can use these tools effectively, adapt to new challenges, and contribute to the company's success."

Admission and organisation of the training

Latvian Chamber of Commerce and Industry implemented this training together with Turiba University. Although the university itself is business administration oriented, the selected training module Business Management & Economics was more than relevant for them. University made an open application for the training and in total 12 participants signed up, took part in the training, and successfully completed it.

The trainings were carried out total in six sessions (14.09.2024, 28.09.2024, 12.10.2024, 26.10.2024, 02.11.2024 and 09.11.2024). Each training session consisted of theory part and practical part, which included group activities and assignments. Additionally, training sessions covered case studies and best practices, participants could learn about and supplement their knowledge with real-life examples.

Trainings itself took place in the premises of the Turiba University. Each training day foresaw the coffee breaks and lunch, accordingly to the participants' needs.

Training was led by one expert:

- Mrs Ieva Bruksle, Mg.oec. – a dedicated professional with extensive expertise in teaching economics, business courses, business intelligence, and sustainable development. She is deeply involved in advancing education through active participation in faculty methodological activities. These include designing and implementing new academic programmes, as well as regularly monitoring and improving existing ones to ensure they remain up-to-date and relevant.
  Her research interests lie in the fields of business competitiveness and sustainability, where she explores strategies for fostering long-term growth and resilience in the ever-changing business environment. Ieva's work reflects a commitment to equipping students and professionals with the tools they need to thrive in these areas.
  In addition to her academic and research contributions, Ieva has significant experience mentoring the development of professional standards. This role highlights her ability to bridge theory and practice, ensuring that educational and professional frameworks align with the needs of the modern workforce. Her holistic approach combines rigorous research, innovative teaching, and practical mentorship to drive meaningful progress in both education and business sectors.

Participants profile and organisation of the training

Participants from Latvia were 20 to 60 years old, from both genders, all of them with bachelor's degree. All of the participants were students of the university where the training was carried out, while also working in different sectors, such as marketing, sales, and consulting. These are also sectors which can benefit from this kind of training. 12 people took part in the tests.

Execution of the Training

The training module which was selected was Business Management & Economics. The reason for this is that this training module is more generic and can be applied for different sectors, not only the construction. Based on this, it was possible to attract people for this course more easily.

Curriculum:

1. Session (14.09.2024) - Foundations of Business Management & Process Management

Introduction to the course

Introduction and defining the specific of digital business management

The importance of effective business management

Overview of business management principles and digital tools

Introduction to process management:

- Definition and importance.
- Key process management tools (flowcharts, Six Sigma, Lean).

Activities:

- Workshop: Map out a business process using flowchart tools.
- Case Study: Analyse a successful process improvement in a company.

Assignment: Develop a process improvement plan for a hypothetical or real organisation.

2. Session (28.09.2024) - Personal Management & Logistics

Importance of effective personal management in business success.

Skills for managing employees: communication, conflict resolution, and motivation.

Performance management and appraisal systems.

Leadership styles and their impact on team performance.

Fundamentals of logistics management:

- Inventory management, supply chain management, and transportation.
- Technology in logistics: ERP, GPS, and automation.

Case Study: Challenges and solutions in real-world logistics.

Activity:

- Role-playing exercises for team conflict resolution and motivation strategies. Simulate a supply chain optimisation scenario.

Assignment: Write a brief analysis of how logistics affect overall business efficiency.

3. Session (12.10.2024) - Business Planning & Cost-Benefit Analysis
The purpose and components of a business plan:

- Executive summary, market analysis, operational plan, and financial plan.

Tools for effective business planning: SWOT analysis and PESTLE analysis.
Principles of cost-benefit analysis:

- Identifying costs and benefits.
- Calculating net present value (NPV) and return on investment (ROI).
- Economic reality effect on business decisions.

Activity:

- Group activity to draft a business model.
- Conduct a cost-benefit analysis.

Assignment: Finalise and submit the business model plan created during the session.

4. Session (26.10.2024) Account Management & Finance Management
Introduction to account management:

- Building and maintaining client relationships.
- Sales pipelines and CRM software.
- Best practices for account retention and growth.

Basics of financial management:

- Budgeting, forecasting, and financial risk assessment.
- Reading and interpreting financial statements.
- Tools for managing business finances.

Activity:

- Mock client meeting to practice account management strategies.
- Analyse financial statements to identify key insights.

Assignment: Write a brief report on financial management's role in long-term business sustainability.

5. Session (02.11.2024) - Invoicing, Annual Balance Calculation, and Report Analysis
The invoicing process:

- Key components of an invoice.
- Legal and tax implications.
- Automating invoicing systems for efficiency.

Basics of annual balance calculation:

- Income statement, balance sheet, and cash flow statement.
- Steps to prepare annual financial statements.

Analysing annual reports for decision-making:

- Key metrics to evaluate financial health.

Activity:

- Create sample invoices using templates.
- Workshop to calculate and interpret an annual balance sheet.

Assignment: Analyse the annual report of company and prepare a short summary.

6. Session (09.11.2024) Integration, Presentation, and Practical Applications
Review of topics covered:

- Connecting process management, logistics, personal management, and finance.
- Strategic alignment of these elements for business success.

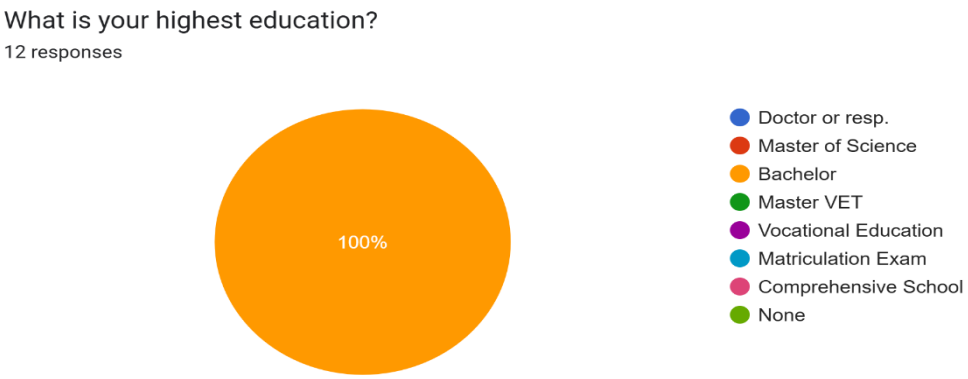
Group Activity: Develop an integrated business strategy incorporating learned concepts.
Participant presentations:

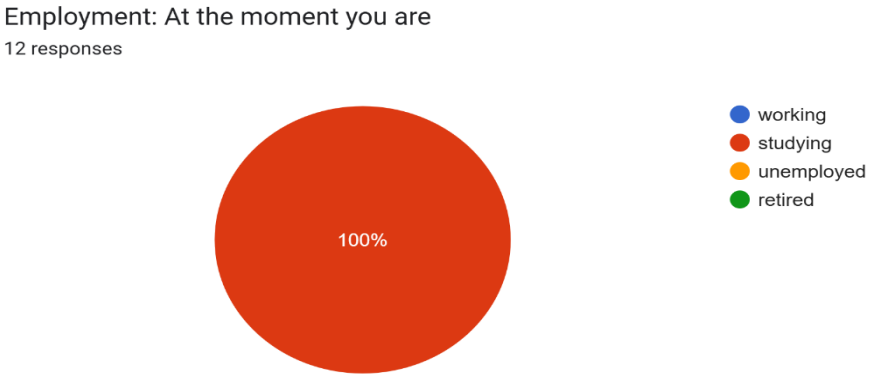
- Present a business strategy or improvement plan based on seminar learnings.
- Feedback and Q&A session.

Seminar wrap-up: Key takeaways and next steps.

Main Findings and Conclusions

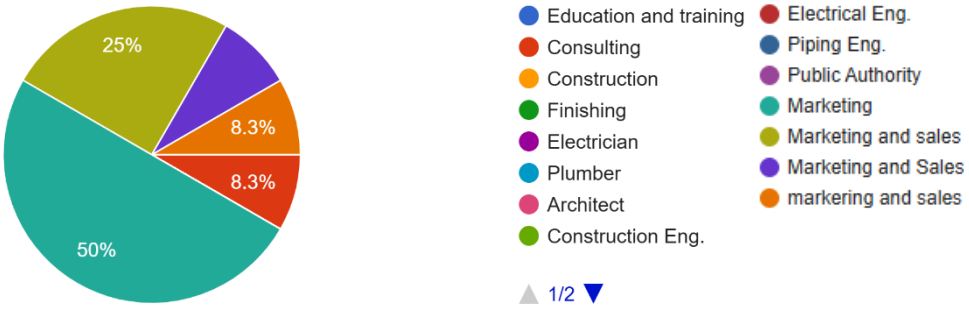
To draw conclusions and gather the feedback from the participants about the trainings, evaluation survey was used. The survey developed within the project was used. It was transferred to Google Forms, allowing effectively to distribute it to the participants and gather the feedback. Below it is possible to see particular questions and answers given by participants.





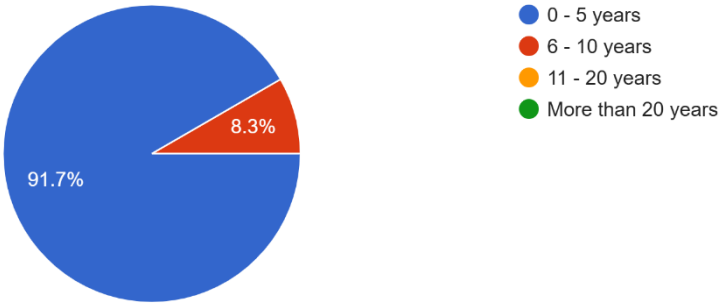
In which branch you are / were / will be working or studying

12 responses



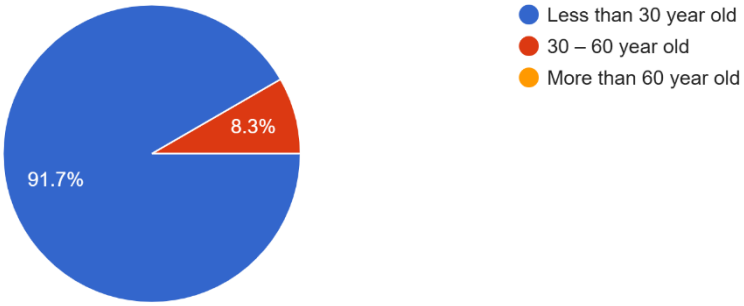
Experience in the branch

12 responses



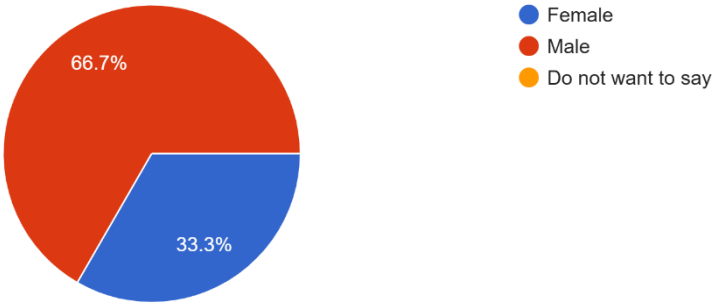
Age: At the moment you are

12 responses

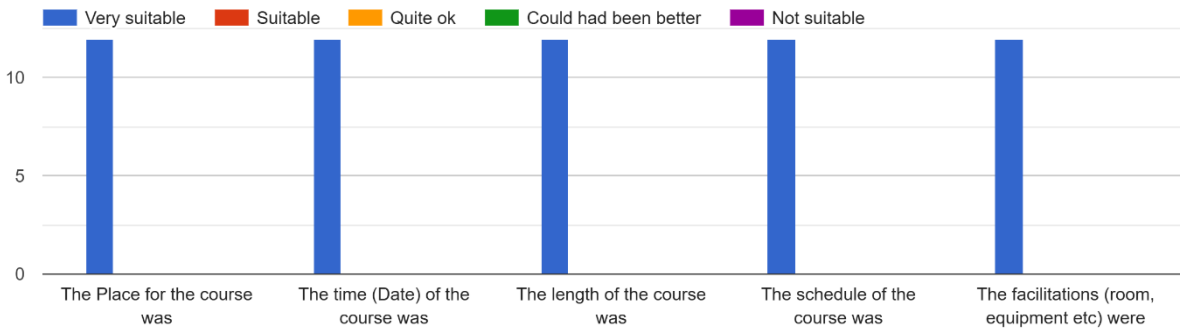


Gender

12 responses

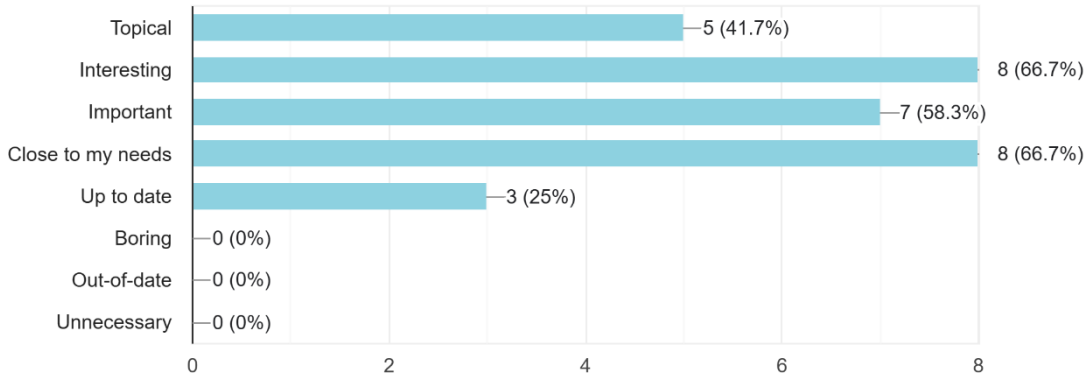


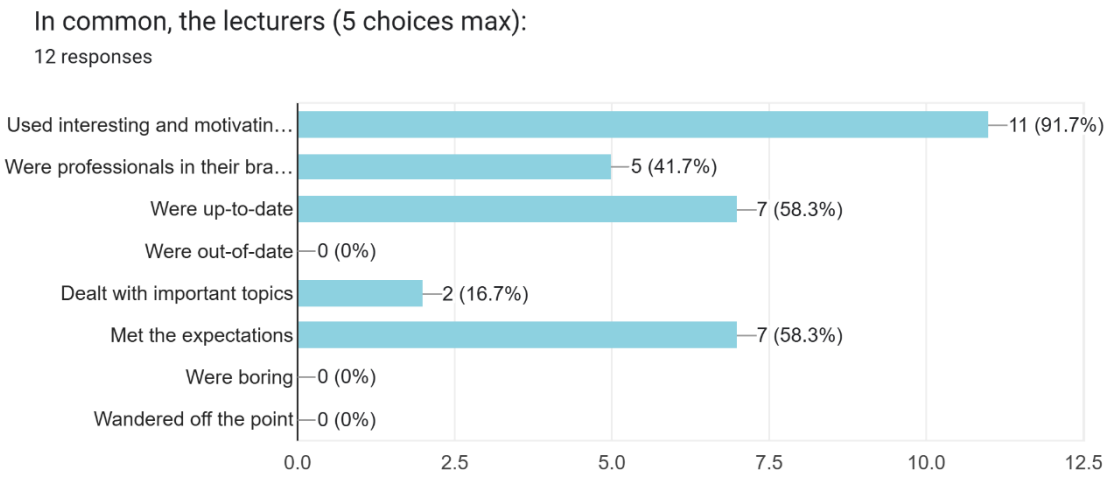
Facilitations

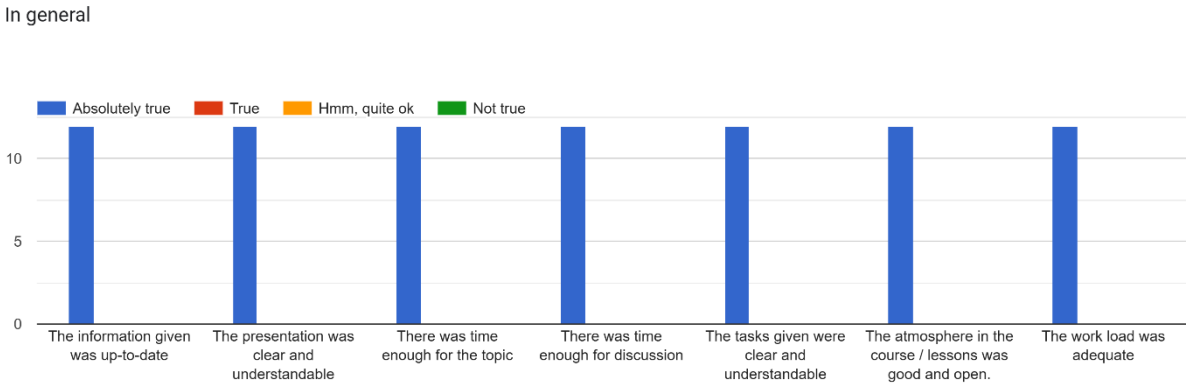


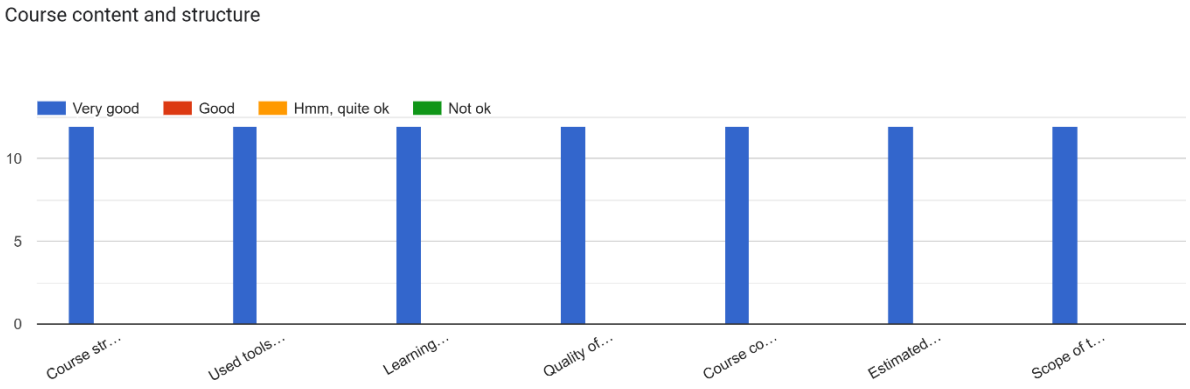
In common, the topics were (5 choices max):

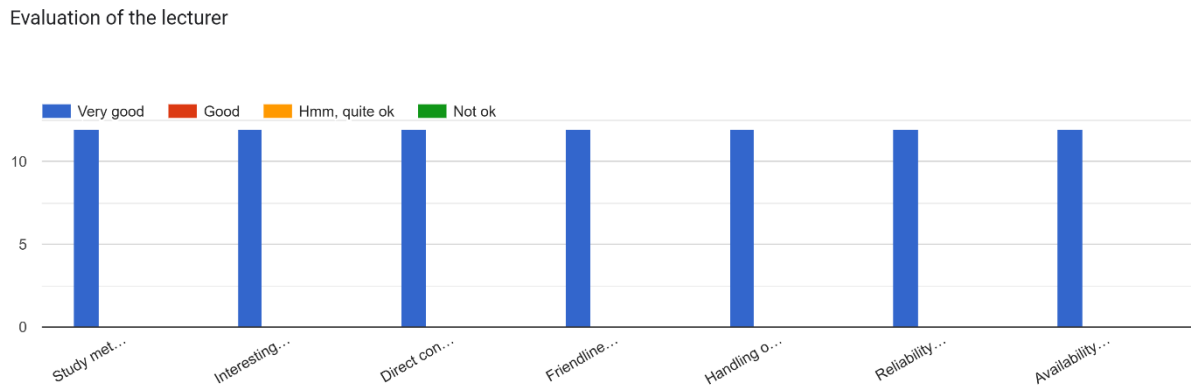
12 responses




In common, the lecturers (5 choices max):
12 responses
Used interesting and motivatin…
Were professionals in their bra…
Were up-to-date
Were out-of-date
Dealt with important topics
Met the expectations
Were boring
Wandered off the point
11 (91.7%)
5 (41.7%)
7 (58.3%)
0 (0%)
2 (16.7%)
7 (58.3%)
0 (0%)
0 (0%)
0.0
2.5
5.0
7.5
10.0
12.5


In general
Absolutely true
True
Hmm, quite ok
Not true
10
5
0
The information given was up-to-date
The presentation was clear and understandable
There was time enough for the topic
There was time enough for discussion
The tasks given were clear and understandable
The atmosphere in the course / lessons was good and open.
The work load was adequate


Course content and structure
Very good
Good
Hmm, quite ok
Not ok
10
5
0
Course str…
Used tools…
Learning…
Quality of…
Course co…
Estimated…
Scope of t…



What would you like to say to teachers / facilitators. What could have done better, what should not be changed etc. Do you have any suggestions for improving the spatial and/or technical equipment?

- Thank you
- Thank you it was good
- Thank you!
- I am satisfied
- Everything was well organized
- I learned a lot of new and useful things
- It was interesting
- Thank you, it was useful. Everything was good.
- Nothing
- No, everything was really good
- Thank you, for interesting course

In general, all participants were left satisfied with the organisation and training content. It is essential to stress out that thanks to the topic, what was very flexible, participants received very essential for them knowledge. The training schedule was not tight, allowing participants to attend the trainings together with their primary studies and work.
The training combined theory and practice, making it very useful for the participants. Additional best practices and case studies supplemented the training and allowed participants to learn about applying particular solutions for particular cases.
At this point, it is not predictable if the training will be replicated, as particular training topic is very popular in Latvia, and is being provided by many service providers. Potentially, other training topics, like Big Data & Networks, could be piloted.

Testing digital entrepreneurship training in Poland[4]

Introduction

After analyzing all the modules and our Polish realities, we chose module number 5 – Digital Constructions Method (DCM). After joint consultations with the trainer and specialists from the Chamber of Crafts, we distinguished from the entire scope those topics that we believe are to be presented to the construction industry in our region.

[4] Prepared by Anna Palowska, Chamber of Crafts and SME in Katowice, Poland

We started the meeting with the participants on May 15, 2024, and ended on September 19, 2024. The workshops were held on-site. The participants used self-study in construction companies where they did their internships or had access to such companies. Then they could check the practical use of tools, construction documentation, programs. At the end of the ceremony, certificates of participation were handed out.

DIG-CON

IZBA RZEMIEŚLNICZA ORAZ MAŁEJ I ŚREDNIEJ PRZEDSIĘBIORCZOŚCI W KATOWICACH

CERTYFIKAT UCZESTNICTWA

NICOLE URBIŃSKA

uczestniczyła w szkoleniu "Przedsiębiorczość cyfrowa" w ramach projektu " Wydajne budownictwo dzięki technologiom cyfrowym w branży budowlanej i wykończeniowej" współfinansowany w ramach programu UE Erasmus+

Grzegorz Miketa

GRZEGORZ MIKETA
Dyrektor Naczelny

Co-funded by the Erasmus+ Programme of the European Union

Jan Klimek

PROF. DR HAB. JAN KLIMEK
Prezes IRMŚP

Katowice, wrzesień 2024

The training conducted at the Chamber of Crafts was not classified in the national system of continuing education, it cannot be assigned to the EQF level. It is an out-of-school training course for people who want to expand their knowledge about the use of digitization in the work of the construction industry. The possibility of training allows for the development and acquisition of new skills for employees, which results in the improvement of qualifications in the industry. Entrepreneurs often get used to the system they introduced to the company 10-20 years ago, and with technological progress, they should change their approach and start adopting digitization in the construction industry as well. It is important to undergo training in this area to show what digitization gives today.

During the training, a visit to a company producing houses from semi-finished products took place. Participants, together with the trainer, could see the stages of house production live. Starting the tour from the office side, i.e. where the building design is created, they moved on to the production stage of finished segments. The company manager talked in an interesting way about the activities and use of digitization. The participants showed interest and asked questions.

Acceptance and organization of the training

The main target group of the training were people participating in study courses, i.e. students, companies, SMEs participating in the course and lecturers. Due to the difficulty in finding a group of entrepreneurs who will systematically participate in the training, we focused on a group of students from a construction school. The involvement of the young generation and their interest in the topic made it sense to conduct this type of training.

We sent a mailing to the associated companies in the Chamber of Crafts, to the construction companies within our area. We asked the members of the Examination Committee in construction professions to inform SME entrepreneurs about the training. At meetings with craftsmen (Educational Council, IR Board Meeting, New Year's meeting) we announced the possibility of taking advantage of free training under the project. The lecturer, Mr. Artur Ledwoń, for his part, also informed about the training. He hung a poster about training in trade schools (attachment). In the Chamber of Crafts, in the hall, we have prepared an information slide (attachment) on the display. There was little interest among entrepreneurs, so we accepted school students learning a profession to participate.

24 people aged between 18 and 25 took part in the tests, roughly half men and half women.

The training began on 15.05.2024 in the conference room at the Chamber of Crafts. The next one took place a day later. The period of June, July, and August was the time for independent learning in construction plants. After the summer holidays in September, two meetings were held: one after a visit to a company that builds houses with semi-finished products, and the next on 19.09.2024 in the classroom at the school. Young people listened to the lecture with interest, asking questions from the industry. Several people met with the trainer after the training to see how digitization was introduced in his company.

Organization of the implementation

The lecturer received training materials prepared by the PP2 HS21 partner, on which he modeled the preparation of the presentation and the scope of his speech. He certainly took into account the realities of the construction industry in Poland. He presented the programs and some of the tools he uses himself. He organized a study visit to the Multi-Comfort factory specializing in the production of prefabricated houses.

The lecture was conducted by Mr. Artur Ledwoń, experienced in working with people as an entrepreneur and trainer. Since 2007, he has been associated with the construction industry as a company owner. The certified construction technician has won two master titles. For personal and company development, he completed courses related to construction activities. Member of the Examination Committee at the Chamber of Crafts in Katowice in construction professions – supports the development of professionals, Member of the Guild Board – works for the promotion and development of construction crafts, Member of the Construction and Building Materials Commission at the Polish Craft Association in Warsaw – enables the shaping of industry policy. He takes an active part in study visits to European cities, where he can learn about and compare construction practices in other countries. Its aim is to develop the construction industry by introducing new technologies and innovative solutions in the construction industry,

promoting craftsmanship among young people, training and educating professionals, which will contribute to the improvement of the quality of services in the construction sector. Thanks to her extensive practice, she conducts training based on examples and technological innovations used in Poland on the construction site.

The lecturer answered the questions asked to him. The atmosphere during the training was relaxed, so the participants were not ashamed to ask questions. Interesting discussions and exchange of experiences were initiated.

During his independent work, the lecturer invited volunteers to his company to check the functioning of digital tools and programs. As young apprentices, they also had the opportunity to check the knowledge obtained during the lecture in the companies where they did their internships. Thanks to the training, they knew what to ask and what to check. The knowledge taught at school is not at such a high level as during training. Yes, they learn the basics, but the teaching system is not yet adapted to new technologies so that they can get information at school. The participants contacted the trainer to inform him about the visits they had made, internships in construction companies and what they were able to check in the field of training.

Implementation of the training

The training took place stationary in the training room at the Chamber of Crafts. There were 4 meetings. The study visit was a valuable point of the training. The holiday time was a great fit for the self-education of the participants. The last day was devoted to explaining the issues, discussing them together, gaining experience and handing out certificates.

Training program: Digital Construction Methods - Methods of digital construction 1. Digital construction documentation (overview+tools)

2. Digitalization in management (task definition, acceptance, defect management)

3. Use of robots on the construction site

4. 3D printing in construction

5. Drones in construction

6. Artificial Intelligence in Management

Due to the problem with gathering a group among entrepreneurs, we focused on the younger generation, who were very willing to cooperate. The course of the training, from sending information about the possibility of taking part in the training to the presentation of certificates, was appropriate.

At the last meeting with the participants of the training, we distributed paper questionnaires, which they completed on the spot. The coach also completed his survey.

They were also asked to make notes from the self-study part.

All participants in the training received a certificate of participation.

Observations and opinions of lecturers

The participants of the training willingly took part in discussions: they asked questions, engaged in self-shaping work. They were most impressed by the opportunity to visit a house manufacturing company. Not only are the on-site workshops themselves important, but also the opportunity to take a close look at the theory taught during the training. Most people said that they were satisfied with the choice of this career path. The atmosphere during the training session was friendly, which had a good effect on the transfer of information.

There was a clear interest in the topic among the participants.

Strengths of the training in the eyes of the participants

After analyzing the questionnaires filled in by the participants, it can be seen that they liked the place, time and schedule of the meeting. The subject of the meeting was interesting, current, close to their needs and important for the listeners. The lecturer was a professional in his industry, had up-to-date knowledge and raised important topics, and the way the training was conducted was interesting, there was time for conversations, he presented the topics in a clear way. The time allocated for self-education was adequate.

Main findings and conclusions

After the first meeting, the interest and positive reception of the participants was visible. A visit to an external company impressed the participants and raised the rank of the training. The opportunity to see the acquired knowledge and theory in practice is the best way to make meetings more attractive. The prepared training program was presented to the participants in an interesting way. We did not manage to use 80 hours for training, but the topics were presented in an understandable way for the recipients, in accordance with the realities of the Polish construction industry for SMEs.

The strong point of the training was a study visit to the factory. The training room and its equipment were positively received by the participants. The refreshments prepared for the guests were a nice touch. The opportunity to discuss various issues and the time allocated for it was needed to keep the atmosphere at the training open.

It is worth including in the curriculum a mandatory visit to a construction company that has implemented digitalization in its work. You can mark the point of the visit of the company's representative, who will show you a given program, application, device. Seeing a drone working in person would be an interesting experience.

Digitalization is now a highly sought-after training topic in many categories, not only in construction. In our opinion, the most difficult thing for participants is to find a large number of hours of training. However, this does not rule out the fact that our Examination Committee in construction professions will ask at meetings whether people taking the exams would feel willing to participate in this type of training. If the training was certified by the appropriate authorities, its importance would certainly increase.

Below are 3 descriptions from the self-learning phase of the participants

1. During my internship, I had the opportunity to work in one of the companies cooperating with my school. My internship took place in the company's office, where I helped with the preparation of cost estimates and offers of various construction works for clients. During my work, I had contact with many technical documentations, thanks to which I improved my skills related to reading them.

In addition, while working on the preparation of bills of quantities for my superiors, I improved my calculation and cost estimation skills. Thanks to participation in the training, I learned Excel functions that are very useful in estimating and preparing construction offers. I learned how to create clear spreadsheets, use formulas to automatically calculate material and labor costs, and prepare professional statements for clients.

Thanks to this knowledge, during my internship in a construction company, I was able to prepare a small cost estimate for one of the projects on my own, which significantly increased my confidence at work and allowed me to better understand the process of creating construction offers.

2. During my summer internship at a construction company, I had the opportunity to work with BIM software, which is used to create digital models of buildings. At the beginning of the internship, I used the knowledge gained during the training, where I got acquainted with the basics.

During my work in the company, I took part in creating building models, which allowed me to put into practice the skills I learned during the training. I learned how to use BIM to collaborate with the project team, make corrections, and detect potential clashes in the project.

Thanks to the knowledge I gained in the field of BIM, I was able to independently model structural elements, such as walls or installations, as well as participate in the design verification process, which increased my confidence in my work.

3. During my internship in a construction company, I had the opportunity to learn about modern technologies, such as drones and thermal imaging cameras. During the training, I learned how these devices can improve construction inspections, improve safety and increase work efficiency. During the training, I gained knowledge about the operation of drones, their capabilities in documenting the progress of work and the use of thermal imaging cameras for building diagnostics.

In the company where I was doing my internship, I had the opportunity to take part in building inspections using drones, which allowed me to quickly obtain detailed photos from hard-to-reach places, such as roofs or facades. This allowed me to help identify potential problems such as structural damage or signs of wear and tears on materials. Also, using a thermal imaging camera, I was able to analyze the tightness of buildings and detect places with increased humidity, which is extremely important when assessing the technical condition of buildings.

The training gave me a solid foundation to work with these technologies, and during the internship I was able to use them effectively. Thanks to the knowledge gained, I was able to operate the drone on my own and analyze images from the thermal imaging camera, which allowed me to fully participate in the construction inspection process.

Testing digital entrepreneurship training in Hungary[5]

Computer aided Design Module

Introduction

Although our actual training has mainly involved the member companies of IPOSZ' interior designer branch organisation, called LOSZ, this training was also suitable and available for micro and small businesses from other branches of finishing trade in terms of providing them with special digital skills for the construction and finishing trades. During the course we take into consideration with special regard to the results „Best practices digital technologies and trainings".

The modul was part of a higher level education program which fully complies with the EU Action Plan for digital education. The individual module comprises 60 teaching hours and included online classroom studies and self-studies combined with group works where the students were able to learn about the wide application possibilities of the Archline design program.

The originally planned course was divided into 10 modules with contents and details to be compliant with the local circumstances.

During the course, the following methods were used:

- Online lectures
- Online learning
- Learning tasks (Self -learning)
- Correction of tasks prepared at home accompanied by a teacher's explanation
- Online discussions
- Assessments

We organized this training, mostly for the company members of our Interior designer professional organisation but some entrepreneurs operating in other brunches of the construction and finishing trades also participated on the training.

Our goal with the training was to teach interior decorators how to use the Archline design program at a high level, and we provided the opportunity for other construction finishing trades to learn about the use of the Archline design program, thereby promoting cooperation between interior designers and contractors.

Period of implementation

We received professional teaching materials, curriculums and the collection of digital technologies and trainings best practices prepared by the project partners and delivered them to our member brunch association operating in the construction industry. The experiences and the training materials provided by the project partners were widely discussed with the membership of IPOSZ, as well as with professionals involved in the sector.

[5] Prepared by Tamas Rettich, Ipartestületek Országos Szövetsége, Hungary

After a few months of preparation, we started our Computer Aided Desing training on November 21, 2023 and the last training day was on February 27, 2024. All the ten training days took place online on Tuesdays, under a fancy name: Tuesday's designer coffee house. The timing of the training was adapted to the economic activities of the participants. Since the training sessions were regularly held on the same days and at the same times, the participants had the opportunity to adapt their other economic activities to the training times. We did not hold any training days in December, around Christmas. It would have been impossible to get participants to sit down for the training at that time.

The exact schedule of the training days will be presented in detail later.

The participants of the workshops examined in detail the teaching materials prepared by the teacher.

It was also determined that the training must be flexible, if a part of the curriculum was deemed particularly important by the students, then it should have been possible to integrate new digital solutions into the curriculum.

During the preparation of the training, the demand was clear from our member companies that not everyone could attend the training days in person due to the distance, so they asked us to hold online all of the training days. We supplemented the online training days with regular online tasks to be solved at home, thus ensuring that all participants were able to get involved with sufficient activity, despite the online format. The trainers regularly consulted with the participants online, along with the homework assignments. The training material itself, the computer-aided design, could be presented much better online. Thus, the needs of the participants and the educational format required by the curriculum were in harmony.

The training fits into the overall adult-education phase of the national system of training, but a direct EQF level cannot be classified to it. It is an out-of-school training organized for the member companies of IPOSZ and organised by IPOSZ together with its branch organizations.

This training perfectly explained and showed those Computer Aided Design solutions of Archline XP that could help staff members as well as SME owners, entrepreneurs operating in construction and finishing trades. All the training participants acquired new skills and new knowledge, which are necessary for their everyday work in the construction sector in today’s digital world.

It is the fundamental interest of construction companies with membership in regional and professional trade associations to be aware of the new digital solutions emerging in the construction sector, to be able to use this knowledge.

In addition to online lessons, the participants during the training had the chance to complete self-learning tasks in many ways, where the instructors continuously gave them feedback.

The topics used in the training could be used of course in the training of enterprises of different sizes. This training is valuable not only for micro-enterprises, but also for medium-sized enterprises. At the same time, it should be emphasized that the main target

group of the training was the interior designers and the staff members of finishing trade construction companies. The main goal of the course material was to make these trained people as up-to-date as possible in Computer Aided Design solutions. The success of this training also proves that there is a significant demand for practice-oriented training. It is recommended to introduce the training as micro-credential training.

Special features of the implementation

After reviewing and discussing the materials received from project partners with our member organizations, the decision was made to carry out a Computer Aided Design training, which is taking into account the specific features of Archline XP programme which design program is widely used in Hungary today.

The Archline XP computer-aided design program is regularly updated, and the solutions available in the program are continuously improved. However, these new solutions are not known in practice by interior designers and especially not known by representatives of other construction professions. Therefore, it is very important that an instructor who knows the program well from time to time presents the latest little tricks, the latest solutions that help the design and visualization for the SME owners.

In a large company, there are always employees who constantly monitor the latest solutions in design programs. However, in a micro-enterprise, there is not necessarily time for this, there is no separate employee for this. Therefore, it is especially important for micro-enterprises, for small companies to have the opportunity to learn about the latest digital solutions through short, practice-oriented training courses. In these training courses, they can gain knowledge that can greatly help the efficiency of their business and improve communication with other construction professions and clients.

With this training project, we set the goal of training 20-25 staff members and SME owners, with the knowledge acquired during the training that can help the construction companies in their daily operation and their development in digitalization.

After successful participation, the participants became able to apply sophisticated working techniques in dealing with Archline XP application programs to solve job-specific tasks, as well as to assess accuracy requirements for measurement tasks and to choose appropriate solutions to problems.

Since in recent years we have provided a number of basic digitization training courses for our member companies and member organizations, such a detailed, sophisticated training course providing professional knowledge was particularly well received by our construction industry member companies.

Based on the preliminary discussions, among the subjects included in this module, we considered the following to be the most important from the point of view of Computer Aided Design training, and we provided training in these topics:

- Archline XP practices. The first steps
- Architectural tools
- Tiling practices
- Technological plans

- Staircase secrets
- Roof structures
- 3D Modelling
- Render settings
- Presentation of documentation

When selecting the parts of the curriculum, an important role was played by the fact that the participants of the training were staff members or SME owners who mostly already had some basic CAD skills. We considered it important to examine and practice topics of the curriculum much more thoroughly. We felt that the 60-hour training perfectly achieved its goal, and we are also certain that the participants will continue to contact the instructor with their questions later, as technology and customer expectations are constantly changing and developing.

The personal consultant part of the training session was optional and available for those needing certain special skills.

Among the training topics proposed here, we tried to present the different application possibilities of Archline XP CAD program to the participants in order to be able to pass on applicable knowledge to the small construction companies.

Admission and organisation of the training

Regardless of the size of the company, no one can be exempt from the effects of digital changes, whether they are employees or employers. Everyone must learn new skills and new knowledge if they want to be actively involved in the more and more digitalized working environment, as more and more digitalized process affects the life of construction companies.

1.67% of companies operating in the Hungarian construction industry are medium enterprises, 5.52% are small enterprises and 92.3% are micro enterprises. And of this 92.3%, 90% are companies with less than 4 people. Typically, IPOSZ's membership comes from this circle of entrepreneurs. It is particularly characteristic for micro-enterprises that they do not have such specialized knowledge; they do not have experts who could use the most up-to-date digital knowledge and applications within the enterprise. However, there is an increasingly significant group of these micro-enterprises who increasingly use modern digital technologies, including computer-aided design programs. This is particularly true for interior designers, who use computer aided design programs much more than the average. In addition, it is very important that interior designers are in contact with almost all construction finishing trades. Thus, through them, the latest digital solutions reach almost the entire spectrum of the construction industry, which is why their continuing education is of particular importance. They can be catalysts for the digitalization of the entire construction industry. And since women typically make up 97% of interior designers, this makes them particularly well-suited to have a significant impact on other sectors of the construction industry.

This circle of micro-entrepreneurs needs external expert help. For them, the acquisition of digitalization skills is important, on the one hand, for the services that they provide directly to their customers and on the other hand when these companies cooperate with

each other's. This can only be done with up-to-date level digital knowledge in the construction industry.

The main target group of the training were the interior designer companies of IPOSZ and we also invited companies from other finishing construction professions. To involve them, we used the help and organizational skills of professional organizations operating in the respective professions above all, the National Association of Interior Designers, which is a member of IPOSZ.

Given the content of the training, we recruited participants primarily through the communication channels of the National Association of Interior Designers, but at the same time we also notified other professional organizations of the IPOSZ about this course.

In addition, the training provided the opportunity for the direct participation of micro and small businesses from the interior design professions, with the aim of upskilling the current state of their computer aided design knowledge, as well as providing participants from other different finishing trades with first-hand information in the field of CAD.

The vast majority of interior designers already use computer-aided design programs, but their knowledge levels vary greatly. There were people in the group who were almost beginners, but there were also those who already had serious experience using these programs. At the same time, the group had a great advantage in that there were participants with different knowledge levels, so the participants also had the opportunity to learn from each other.

When we invited the training applicants, we assumed that the participants can handle their smartphones and laptops at an everyday users skill level, and that the participants have a subscription to the Archline XP program.

The participants were familiar with the basic structure of the Archline XP program, but the practical knowledge and solutions provided during the training for them contained a lot of new information.

As the main target group of this training were the interior designer companies of IPOSZ and companies from other finishing construction professions who are in direct daily contact with interior designers we used for recruitments of participants primarily the communication channels of the National Association of Interior Designers, which association is a member of IPOSZ but at the same time we also notified other professional organizations of IPOSZ operating in the field of construction about this course.

IPOSZ member organizations are present throughout the country, we have offices in a total of 140 cities in the country and more than 20 professional organisations belong to IPOSZ.

IPOSZ provided the opportunity for participants to take part in the training, actually from every part of Hungary.

The training was advertised on the National Association of Interior Designers'websites which association is a member of IPOSZ. Direct marketing strategies (phone calls and e-mails and many face-to-face conversations) were used by IPOSZ staff members to reach most of the participants. The whole training took place in online form. Our member

organisations operating in the field of construction were notified about the planned course. The participants were gathered via this way. Most of the participants came from the National Association of Interior Designers.

All days of this training were held online.

Therefore, we attach the print screens for the individual training days.

On the individual training days, xx people participated:

On November 21, 2023, 25 people participated in the online training

On November 28, 2023, 25 people participated in the online training

On December 19, 2023, 25 people participated in the online training

On January 09, 2024, 33 people participated in the online training

On January 16, 2024, 28 people participated in the online training

On January 30, 2024, 30 people participated in the online training

On February 06, 2024, 30 people participated in the online training

On February 13, 2024, 35 people participated in the online training

On February 20, 2024, 24 people participated in the online training

On February 27, 2024, 27 people participated in the online training

Amount of lessons, amount of teaching hours

On November 21, 2023, with 4 teaching hours and 2 hours individual online consultation

On November 28, 2023, with 4 teaching hours and 2 hours individual online consultation

On December 19, 2023, with 4 teaching hours and 2 hours individual online consultation

On January 09, 2024, with 4 teaching hours and 2 hours individual online consultation

On January 16, 2024, with 4 teaching hours and 2 hours individual online consultation

On January 30, 2024, with 4 teaching hours and 2 hours individual online consultation

On February 06, 2024, with 4 teaching hours and 2 hours individual online consultation

On February 13, 2024, with 4 teaching hours and 2 hours individual online consultation

On February 20 2024, with 4 teaching hours and 2 hours individual online consultation

On February 27 2024, with 4 teaching hours and 2 hours individual online consultation

Most of the training days were followed by self-study practices, and was supplemented with further student-teacher online conversations.

Organisation of the implementation

The organization of the implementation was carried out by the staff members of the IPOSZ together with the experts of the National Association of Interior Designers and the regional and branch member organisations of IPOSZ were also involved in the implementation.

The trainer came from the National Association of Interior Designers. The topic and structure of the curriculum were developed after extensive discussions with the trainer and other experts in computer-aided design

We were in a relatively easier position when organized this course, as most of the companies we approached already had basic knowledge in the field of computer-aided design programmes and were therefore aware that their vital interest was their continuous development and keeping their design knowledge up to date. Therefore, this training was implemented with a much higher number of participants than average number of participants.

When the teaching the use of computer-aided design programs in interior design began in Hungary, our trainer had been among the first students. The use of computer-aided design programs requires a secondary education for the interior design profession and then to follow the latest developments in the profession also requires continuous training. The teacher has been teaching the Archline software since 2002 but also uses and teaches several other softwares. After finishing the interior design school, she completed the master course, which wss a two-year training course where architects teach.

The trainer has developed her specialized knowledge in recent years. She has also worked in a lighting studio, gained special experience there. Later she started her own business. She also worked in a kitchen design studio. She has many years of teaching and examiner experience in various vocational training institutions for quite some time.

Of course, during the preparation and planning of this training course, we also asked the opinion of our member organizations about the possible trainers, since we definitely wanted to invite trainers who know the world of computer-aided design programmes available for micro and small businesses. Besides that, the selected trainer maintains excellent professional relations with the professional organisation and several leading companies providing Computer Aided Design solutions for the construction sector. The trainer has been holding the position of professional co-chairman of the National Association of Interior Designers for quite some time.

It was a very good experience that we always stayed after the official classes because there were always so many questions. We met at many personal events between the two training sessions, but we consulted with many people online between the two weeks. We have maintained this practice ever since. Nowadays, you can't be an interior designer without using this software. The support is still available today. We recorded all the training and sent the recordings to the participants so that they can watch the classes again later.

This training defined the main digital aspects and prepared the participants with specific implementation methods, based on which they are able to further develop their own

computer aided design activities, even as an independent designer. Of course, in the future, we will try to ensure that all those who took part in the training can maintain professional contact with the instructor, so that if they later need help during their business activities, they can receive this help from the instructor.

Notes on the implementation within the trainees` company or organisation: sequence of the accompanying coaching, frequency and intensity of the consultations, thematic focus of the consultations etc.

As a general comment, it can be stated that during the implementation, the participants reviewed an extremely wide range of digital solutions and adapted them to their own business needs.

Actually, a curriculum draft was made, but only a short one, which was an itinerary for the instructor, based on which she could start the teaching lessons, and based on that she shaped the presentation based on the questions of the participants. What was unique in this training that it was not prepared according to the school curriculum, but rather it was a type of education that supplemented what was taught in the school curriculum. Practical topics that had been forgotten about school education were included in this course, which made it really useful. We enclose the draft curriculum used by the instructor. We also attach the printscreens confirming each training day clearly show what kind of knowledge was presented during the training and what technical issues were resolved during the course.

We must point out that the training materials prepared by the project partners helped us a lot in designing this training, many elements of them we took into account in our training. We must also note, however, that for the training in Hungary we had to take into account the existing economic and technical environment, and the often-different development level and economic opportunities exist in Hungary for small businesses. We always do our utmost to ensure that the good practices of other countries could be continuously implemented in Hungary, and we consider this to be a priority task and benefit of the project.

Examination was not held. Concentrating on individual development, for the participants as well as for the trainer. The Hungarian education system centrally regulates the documents that in the official adult education system could be issued and which exams are required for this. We ourselves can issue a certificate to the participants about the training they have implemented, which indicates the content of the training, the fact that it was completed and refers to the project in which the training was carried out. All participants received a certificate.

Observations and feedback from lecturers

There were several training days when more lessons could have been added, when participants said that it would be good if this or that topic could be explained better, more thoroughly. But in fact, if someone had a specific question, we always ensured the possibility to discuss it in detail.

The instructor really enjoyed that the participants were active. It was very good feedback to her that the participants asked a lot of questions.

The participants were extremely interested.

It was very good to teach people who live in the world of business on a daily basis and were able to use what was teached during the course with practical examples and to think further with the trainers.

The instructors, through different online channels were in constant contact with the participants during the entire duration of the training. Therefore, she dealt with them along individual themes.

One of the most effective answers to tackle the challenges of the present digitalized world is the further training of enterprises. In view of the current situation of the member compnaies of IPOSZ, the potential participants, further training should also reach the population over 40 years, which age group is currently the most burdened on the labour market, apparently has a lot of work to do, so it is difficult to convince them that in 5-10 years' time they as service providers may disappear from the market, if they do not get acquainted with new digital skills.

Convincing this layer of consultants and service providers will be a very serious task for IPOSZ.

But what characterized the participants of this course was that they were aware of the need to constantly develop their knowledge and improve their computer-aided design skills.

Strengths of the training as seen by the participants

Its strength was that it gave us extra things that are not in the traditional curriculum and that are not taught in school or not taught in such detail.

Its strength is who the instructor was.

Our instructor was a designer in practice, so she knows the profession, not just the software.

It's great to know that we have a professional organization that can provide us such training, a training that interesting for us. It's good to belong here.

A big advantage of the course was that, although the represented businesses were small companies, the participants were fully committed to improving themselves. The teacher took advantage of all this determination very well, giving the participants very good tasks, which constantly maintained the participants' interest.

Based on the completed evaluation forms, it can be concluded that the participants were largely satisfied with the training. The training was rated as a useful tool what encouraged them for further develop their digital skills.

The training had the advantage that the instructor presented the course materials through numerous practical examples and the tasks prepared for the participants greatly helped the involvement of all participants.

Since most of the participants came from various professional member organizations of the IPOSZ, so the group covered a very wide circle and the training had a very serious added value that participants coming from far away from each other got to know the developments and problems experienced in other regions, and also the good examples. One of the main strengths of the training was this organizational development effect.

Weaknesses of the training as seen by the participants

Although you can share the screen, you can look into someone else's computer, but since the training was online, not face-to-face, the questions that would have come up in a personal training session could not come up that way.

In school, in personal training, the teacher could go to everyone and help if the student gets stuck somewhere. That was not possible here. Of course, whoever indicated to the instructor that he/she was stuck somewhere, the instructor always helped her/him.

Online training has advantages, but also disadvantages.

The participants typically came from the professional organizations of IPOSZ, in which organizations the member companies are typically micro and small enterprises.

These member companies carry out their business activities depending on the customer's needs and tasks, and although they tried to participate every Tuesday training day, it unfortunately happened that some participants were unable to attend one or two training days or had to withdraw from the training after a while. But fortunately, they also received recordings of the courses, so they were able to watch the training later.

Summary assessment of implementation

1.67% of companies operating in the Hungarian construction industry are medium enterprises, 5.52% are small enterprises and 92.3% are micro enterprises. And of this 92.3%, 90% are companies with less than 4 people. Typically, IPOSZ's membership comes from this circle of entrepreneurs. It is particularly a characteristic of construction micro-enterprises that they do not have such specialized knowledge; they do not have experts who could use the most up-to-date digital knowledge and applications within the enterprise.

After reviewing and discussing the materials received from project partners with our member organizations, the decision was made to carry out a Computer Aided Design training, which is taking into account the specific features of Archline XP programme which design program is widely used in Hungary today.

The Archline XP computer-aided design program is regularly updated, and the solutions available in the program are continuously improved. However, these new solutions are not known in practice by interior designers and especially not known by representatives of other construction professions. Therefore, it is very important that an instructor who knows the program well from time to time presents the latest little tricks, the latest solutions that help the design and visualization for the SME owners.

With this training project, we set the goal of training 20-25 staff members and SME owners, with the knowledge acquired during the training that can help the construction companies in their daily operation and their development in digitalization.

After successful participation, the participants became able to apply sophisticated working techniques in dealing with Archline XP application programs to solve job-specific tasks, as well as to assess accuracy requirements for measurement tasks and to choose appropriate solutions to problems.

Despite the fact that micro-enterprises have significantly smaller financial and human resources than large enterprises, they still see one of their possible breaking points if they educate themselves and become more digitalized in certain construction areas.

The target group we targeted with this training most of them already had a real, practical knowledge on Computer-Aided Desing. They had the necessary pre-training knowledge of the basic curriculum. The training supplemented the curriculum with all the planned topics in such a relatively small number of training hours, sixty hours but with an extremely intensive practice-oriented way, in order to learn deeply special parts of the curriculum, in order to have real usable knowledge.

The weighing of the training topics in this way was confirmed by the positive feedback of the participants.

In addition to these conclusions, we must emphasize that many more projects, support, information and services are needed in order to speed up the catching up of the construction microbusiness sector to the digitalisation.

We are convinced that if we are not able to address the many thousands of family and micro businesses on a wider scale in time with appropriate training, digital training, then an employment crisis may arise, as they will not be able to perform their construction work at a high level. Digitization is bringing new devices and technical solutions to the market and into the hands of wide circles of the population. Therefore, trainings in this direction, such as those implemented in our present project, can contribute to keep well-trained the micro enterprises working in the construction.

Strengths and advantages of training

The strength of the training, in our opinion, is exactly what we explained earlier, that we managed to attract staff members working with small companies from the most diverse professions in the construction sector on a regular daily basis to the training. Another strength of the training was that we were able to do this taking into account the experiences of the international project partners.

For this training, the trainer basically came from the micro companies' world as we selected her on the recommendation of our member organizations. It was a very significant experience for us.

Hints for future use, suggestions for possible improvements or further developments

This is twofold, because different age groups approach it differently. It can be an advantage or a disadvantage that we were in a group, all ages together. The students' prior knowledge was different, but this also has positive consequences, since those who were less experienced learned a lot from how the more experienced ones did it.

It was very good that the training was online.

It would be good to include new areas. For example, to include artificial intelligence more prominently in the training.

It would be worth introducing other computer-aided design software, although Archline is the one most used.

The use of digital solutions in construction processes in the case of such small businesses sometimes exceeds their financial capabilities, although it is clear that most of the digital solutions are available for them and their use can be really effective for micro companies. For some digital solutions, they need external service providers who can provide immediate assistance. Fortunately, profit-oriented companies nowadays offer solutions for this, but business associations such as IPOSZ are still often needed so that new solutions can reach the right place at the right time.

It is an obvious fact that short-term, practice-oriented training courses, where small businesses can improve their digital skills, can help a lot here. There is still a need for more similar training offering industry-specific solutions in order to convince the masses of micro and small enterprises. For this, it would be very important to start state support programs in this area as well.

In the long term, our plans definitely include the organization of new training courses, involving a much wider range of the target group.

Although we can't tell when the course will continue, the Interior Designer Café, the Interior Designer Rendevú, which grew from the Tuesday training days into regular weekly meetings, will continue and the topic of these weekly meetings is often Computer Aided Design.

It is a club-like event that always has a theme.

What we were able to do in this project was to create the training material for a short-term practice-oriented training for our professional member companies dealing Computer-Aided Desing.

If our members' associations want to carry out similar training in their own region or for other professions, than we can provide specialists and topics for their trainings. The extraordinary advantage of our industry association's network is that our branch members usually have the necessary premises and infrastructure for such training and their network is nationwide.

We consider the training as a pilot training, since only a few of our member companies had the opportunity to join the training, those who on the one hand had the necessary basic digital knowledge and on the other hand were able to undertake to participate in the training.

In the long term, our plan is definitely to launch the organization of new training courses, involving a much wider range of the target group.

The training materials have been prepared and tested, the instructors/teachers are available, and if adequate financial support can be gained, this short-term training that has just been implemented can be implemented in many other times as well.

We have selected an instructor who is capable of holding similar training courses later in the future.

Such short-term training courses as we provided in this project must be strengthened in adult education. The experience of this project could help make decision-makers aware of the need to finance similar short-term training courses for micro companies.

Network and Communication Technologies Modul

Introduction

Although our actual training has mainly involved the member companies of IPOSZ' interior designer branch organisation, called LOSZ, this training was also suitable and available for micro and small businesses from other brunches of finishing trade in terms of providing them with special digital skills for the construction and finishing trades. During the course we take into consider with special regard to the results „Best practices digital technologies and trainings".

The modul was part of a higher level education program which fully complies with the EU Action Plan for digital education. The individual module comprises 52 teaching hours and included online classroom studies and self-studies combined with group works where the students were able to learn about the wide application possibilities of the different network and communication technologies.

The originally planned course was divided into 13 modules with contents and details to be compliant with the local circumstances.

Based on all this, the training carried out by IPOSZ adopted many elements received from HS21, in a way that the approach of course was practical, and considered the background of the participants.

During the course, the following methods were used:

- In person lectures
- Online lectures
- Online learning
- Learning tasks (Self -learning)
- Correction of tasks prepared at home accompanied by a teacher's explanation
- In person and Online discussions
- Assessments

We organized this training mostly for the company members of our Interior designer professional organisation but some entrepreneurs operating in other brunches of the construction and finishing trades also participated on the training.
Our goal with the training was to teach interior decorators how to use the network and communication technologies at a high level, and we provided the opportunity for other construction finishing trades to learn about the use of these NC technologies, thereby promoting cooperation between interior designers and contractors.

Period of implementation
We received professional teaching materials, curriculums and the collection of digital technologies and trainings best practices prepared by the project partners and delivered

them to our member brunch association operating in the construction industry. The experiences and the training materials provided by the project partners were widely discussed with the membership of IPOSZ, as well as with professionals involved in the sector.
After a few months of preparation we started our Network and Communication Technologies training on March 05, 2024 and the last training day was on June 19, 2024. Most of the thirteen training days took place on Tuesdays, under a fancy name: Tuesday's designer coffee house. There were training days with personal training and there were online training days. This depended on the instructor's intention and availability, but it also depended on the topic. Due to the topic of some trainings, we specifically held the training in person, as this was the only way to guarantee the protection of personal data. The timing of the trainings was adapted to the economic activities of the participants. Since the trainings were regularly held on the same days and mostly at the same times, the participants had the opportunity to adapt their other economic activities to the training schedule. We felt it was important that we could complete the training before the summer break. It would have been impossible to get participants to sit down for the training at that time.
The exact schedule of the training days will be presented in details later.

The participants of the workshops examined in detail the teaching materials prepared by the teacher.
It was also determined that the training must be flexible, if a part of the curriculum was deemed particularly important by the students, then it should had been possible to integrate new digital solutions into the curriculum.

We supplemented the in-person and online training days with regular online tasks to be solved at home, thus ensuring that all participants were able to get involved with sufficient activity. The trainers regularly consulted with the participants online, along the homework assignments. Thus, the needs of the participants and the educational format required by the curriculum were in harmony.

Brief explanation of how the training is to be classified in the national system of continuing vocational training, EQF level, significance of usability on the labour market, significance for activities in companies, etc.

The training fits into the overall adult-education phase of the national system of trainings, but a direct EQF level can not be classified to it. It is an out-of-school training organized for the member companies of IPOSZ and organised by IPOSZ together with its branch organizations.
This training perfectly explained and showed those Network and Communication Technologies solutions that could help staff members as well as SME owners, entrepreneurs operating in construction and finishing trades. All the training participants acquired new skills and new knowledge, which are necessary for their everyday work in the construction sector in today’s digital world.

It is the fundamental interest of construction companies with membership in regional and professional trade associations to be aware of the new digital solutions emerging in the construction sector, to be able to use these technologies, knowledges.

In addition to online lessons, the participants during the training had the chance to complete self-learning tasks in many ways, where the instructors continuously gave them feedback.

The topics used in the training could be used of course in the training of enterprises of different sizes. This training is valuable not only for micro-enterprises, but also for medium-sized enterprises. At the same time, it should be emphasized that the main target group of the training was the interior designers and the staff members of finishing trade construction companies. The main goal of the course material was to make these trained persons as up-to-date as possible in Network and Communication Technologies solutions. The success of this training also proves that there is a significant demand for practice-oriented trainings. It is recommended to introduce the training as a micro-credential training.

Special features of the implementation

After reviewing and discussing the materials received from project partners with our member organizations, the decision was made to carry out a Network and Communication Technologies training. We reviewed the units listed in the original curriculum and selected several of them, or supplemented them with other modules which technologies is widely used in Hungary today.

The special modules of the Network and Communication Technologies program are constantly developing and being updated, and the solutions available in the program are continuously improved. However, these new solutions are not widely known in practice by interior designers and by representatives of other construction professions. Therefore, it is very important that the instructors who know in details the special modules of the program from time to time presents the latest little tricks, the latest solutions of these modules that could help for the SME owners.
In a large company, there are always employees who constantly monitor the latest solutions in NCT programs. However, in a micro-enterprise, there is not necessarily time for this, there is no separate employee for this. Therefore, it is especially important for micro-enterprises, for small companies to have the opportunity to learn about the latest digital solutions through short, practice-oriented training courses. In these trainings, they can gain knowledge that can greatly help the efficiency of their business and improve communication with other construction professions and clients.
With this training of the project, we set the goal of training 10-15 staff members and SME owners. The knowledge acquired during the training can help the construction companies in their daily operation and their development in digitalization.
After successful participation, the participants became able to apply sophisticated NCT techniques to solve job and company-specific tasks, as well as to choose appropriate solutions to their problems.

Since in recent years we have provided a number of basic digitization training courses for our member companies and member organizations, such a detailed, sophisticated training course providing professional knowledge was particularly well received by our construction industry member companies.

Based on the preliminary discussions, among the subjects included in this module, we considered the followings to be the most important from the point of view of Network and Communication Technologies training, and we provided training in these topics:

- Website creation. The first steps
- Appearance on Instagram
- Online image building
- How does the real estate market work? What are the communication tools for effective designer behavior?
- Challenges of the hybrid world: The relationship between home office and urban planning.
- Etiquette of online communication. Subjective and spatial challenges.
- The wellbeing of digital networks, or life in the cloud.
- How to use Tik-Tok?
- Facebook ad management
- Blockchain: the role of decentralized networks
- Development of communication infrastructure
- Google Ads ad management
- Communication in practice

When selecting the parts of the curriculum, an important role was played by the fact that the participants of the training were staff members or SME owners who mostly will use their new communication skills in daily business. We considered it important to examine and practice topics of the curriculum much more thoroughly. We felt that the almost 60 hours training perfectly achieved its goal, and we are also certain that the participants will continue to contact the instructors with their questions later, as technology and customer expectations are constantly changing and developing..
The personal consultant part of the training was optional and available for those needing certain special skills.
Among the training topics proposed here, we tried to present the different network and communication technologies to the participants in order to be able to pass on applicable knowledge to the small construction companies.

Admission and organisation of the training

Regardless of the size of the company, no one can be exempt from the effects of the digital changes, whether they are employees or employers. Everyone must learn new skills and new knowledge if they want to be actively involved in the more and more digitalized working environment, as more and more digitalized process affect the life of construction companies.
1.67% of companies operating in the Hungarian construction industry are medium enterprises, 5.52% are small enterprises and 92.3% are micro enterprises. And of this

92.3%, 90% are companies with less than 4 people. Typically, IPOSZ's membership comes from this circle of entrepreneurs. It is particularly characteristic for micro-enterprises that they do not have special experts who could use the most up-to-date network and communication technologies within the enterprise. However, there is an increasingly significant group of these micro-enterprises who increasingly use modern digital communication technologies. This is particularly true for interior designers and representatives of finishing trades, who are in constant communication with their customers and their partners. In addition, it is very important that interior designers are in contact with almost all construction finishing trades. Thus, through them, the latest network and communication technologies reach almost the entire spectrum of the construction industry, which is why their continuing education is of particular importance. They can be catalysts for the digitalization of the entire construction industry. And since women typically make up 97% of interior designers, this makes them particularly well-suited to have a significant impact on other sectors of the construction industry.

This circle of micro-entrepreneurs needs external expert help. For them, the acquisition of digitalization skills in network and communication technologies is important, on the one hand, for the services that they provide directly to their costumers and on the other hand when these companies cooperate with each others. This can only be done with up-to-date level digital knowledge in the network and communication technologies.

The main target group of the training were the interior designer companies of IPOSZ and we also invited companies from other finishing construction professions. To involve them, we used the help and organizational skills of professional organizations operating in the respective professions above all, the National Association of Interior Designers, which is a member organization of IPOSZ.
Given the content of the training, we recruited participants primarily through the communication channels of the National Association of Interior Designers, but at the same time we also notified other professional organizations of IPOSZ about this course.
In addition, the training provided the opportunity for the direct participation of micro and small businesses from the interior design professions, with the aim of upskilling the current state of their network and communication technologies knowledge, as well as providing participants from other different finishing trades with first-hand information in the field of network and communication technologies.
The vast majority of interior designers already use many aspects of network and communication technologies, but their knowledge levels vary greatly. There were people in the group who were almost beginners, but there were also those who already had serious experience using these skills. At the same time, the group had a great advantage in that there were participants with different knowledge levels, so the participants also had the opportunity to learn from each other.

When we invited the training applicants, we assumed that the participants can handle their smartphones and laptops at an everyday users skill level, but the practical knowledge and solutions provided during the training for them contained a lot of new information.

As the main target group of this training were the interior designer companies of IPOSZ and companies from other finishing construction professions who are in direct daily contact with interior designers we used for recruitments of participants primarily the communication channels of the National Association of Interior Designers, which association is a member of IPOSZ but at the same time we also notified other professional organizations of IPOSZ operating in the field of construction about this course.

IPOSZ member organizations are present throughout the country, we have offices in a total of 140 cities in the country and more than 20 professional organisations belong to IPOSZ. IPOSZ provided the opportunity for participants to take part in the training, actually from every part of Hungary.
The training was advertised on the National Association of Interior Designers'websites which association is a member of IPOSZ. Direct marketing strategies (phone calls and e-mails and many face-to-face conversations) were used by IPOSZ staff members to reach most of the participants. Certain training days took place as an in-person training and other training days were implemented in online form or sometimes as a hybrid training. Our member organisations operating in the field of construction were notified about the planned course. The participants were gathered via this way. Most of the participants came from the National Association of Interior Designers.

The days of this training were held in-person or online. For in-person training, we attach list of participants sheet, and for online training, we attach screenshots.
On the individual training days, xx people participated:
On March 05, 2024, 29 people participated on the online training
On March 12, 2024, 18 people participated on the in-person training
On March 19, 2024, 14 people participated on the in-person training
On March 26, 2024, 14 people participated on the in-person training
On April 09, 2024, 15 people participated on the in-person training
On April 16, 2024, 14 people participated on the in-person training
On April 23, 2024, 20 people participated on the hybrid training
On April 30, 2024, 15 people participated on the in-person training
On May 07, 2024, 13 people participated on the in-person training
On May 22, 2024, 8 people participated on the online training
On May 23, 2024, 13 people participated on the in-person training
On May 28, 2024, 14 people participated on the in-person training
On June 19, 2024, 16 people participated on the online training

Amount of lessons, amount of teaching hours:
On March 05, 2024, with 4 teaching hours and 2 hours individual online consultation
On March 12, 2024, with 4 teaching hours and 2 hours individual in-person consultation
On March 19, 2024, with 4 teaching hours and 2 hours individual in-person consultation
On March 26, 2024, with 4 teaching hours and 2 hours individual in-person consultation
On April 09, 2024, with 4 teaching hours and 2 hours individual in-person consultation
On April 16, 2024, with 4 teaching hours and 2 hours individual in-person consultation
On April 23, 2024, with 4 teaching hours and 2 hours individual in-person consultation
On April 30, 2024, with 4 teaching hours and 2 hours individual in-person consultation

On May 07, 2024, with 4 teaching hours and 2 hours individual in-person consultation
On May 22 2024, with 4 teaching hours and 2 hours individual online consultation
On May 23, 2024, with 4 teaching hours and 2 hours individual in-person consultation
On May 28, 2024, with 4 teaching hours and 2 hours individual in-person consultation
On June 19, 2024, with 4 teaching hours and 2 hours individual online consultation

Most of the training days were followed by self-study practices, and was supplemented with further student-teacher online conversations.

Organisation of the implementation
The organization of the implementation was carried out by the staff members of the IPOSZ together with the experts of National Association of Interior Designers and the regional and branch member organisations of IPOSZ were also involved in the implementation.
The trainers came from the business world and they have direct contact with the IPOSZ and the National Association of Interior Designers as well. The topic and structure of the curriculums were developed after extensive discussions with the trainers and other experts in network and communication technologies.

We were in a relatively easier position when organized this course, as most of the companies we approached already had basic knowledge in the field of network and communication technologies and were therefore aware that their vital interest was their continuous development and keeping their knowledge up to date. Therefore, this training was implemented with a high number of committed participants than usually.

The use of network and communication technologies requires a special knowledge and direct professional orientation from the instructors and that is a basic requirements for them to follow the latest developments in the network and communication technologies. The teachers have been teaching since decades, and maybe most important they have been teachning micro and small companies.
All the trainers have developed specialized knowledge in recent years.
Of course during the preparation and planning of this training course, we also asked the opinion of our member organizations about the possible trainers, since we definitely wanted to invite trainers who know the world of network and communication technologies available for micro and small businesses. Besides of it the selected trainers maintain excellent professional relations with the professional organisations and universities as well.

It was a very good experience that we always stayed after the official classes because there were always so many questions. For the participants it was possible to meet online with their instructors between the two trainings, and they consulted with them many times online between the two training days.

This training defined the main digital aspects of network and communication technologies and prepared the participants with specific implementation methods, based on which they are able to further develop their own activities, even as an independent technology user. Of

course, in the future, we will try to ensure that all those who took part in the training can maintain professional contact with the instructor, so that if they later need help during their business activities, they can receive this help from the instructors.

As a general comment, it can be stated that during the implementation, the participants reviewed an extremely wide range of digital solutions and adapted them to their own business needs.

Actually, a curriculum draft was made, but only a short one, which was an itinerary for the instructors, based on their long-standing relevant experiences they could create the teaching lessons, which were constantly reflected by the questions of the participants. What was unique in this training that it was not prepared according to the school curriculum, but rather it was a type of everyday use curriculum. Practical examples were included in this course, which made it really useful. We enclose the draft curriculums used by the instructors.
We must point out that the training materials prepared by the project partners helped us a lot in designing this training, many elements of them we took into account in our training. We must also note, however, that for the training in Hungary we had to take into account the existing economic and technical environment, and the often different development level and economic opportunities exist in Hungary for small businesses. We always do our utmost to ensure that the good practices of other countries could be continuously implemented in Hungary, and we consider this to be a priority task and benefit of the project.

Examination was not held. Concentrated on individual development, for the participants as well as for the trainers. The Hungarian education system centrally regulates the documents that in the official adult education system could be issued and which exams are required for this. We ourselves can issue a certificate to the participants about the training they have implemented, which indicates the content of the training, the fact that it was completed and refers to the project in which the training was carried out. All participants received a certificate.

Observations and feedback from lecturers

There were several training days when more lessons could have been added, when participants said that it would be good if this or that topic could be explained better, more thoroughly. But in fact, if someone had a specific question, we always ensured the possibility to discuss it in details.

The instructors really enjoyed that the participants were active. It was very good feedback to them that the participants asked a lot of questions.
The participants were extremely interested..
It was very good to teach people who live in the world of businesses on a daily basis and were able to use what was teached during the course with practical examples and to think further with the trainers.

The instructors through different online channels were in constant contact with the participants during the entire duration of the training. Therefore, they dealt with them along individual themes.

One of the most effective answers to tachle the challenges of the present digitalised world is the further training of enterprises. In view of the current situation of the member compnaies of IPOSZ, the potential participants, further training should also reach the population over 40 years, which age group is currently the most burdened on the labour market, apparently has a lot of work to do, so it is difficult to convince them that in 5-10 years time they as service providers may disappear from the market, if they do not get acquinted with new digital skills.
Convincing this layer of service providers will be a very serious task for the SME organisations like IPOSZ.
But what characterized the participants of this course was that they were aware of the need to constantly develop their knowledge and improve their networking and communication skills.

Strengths of the training as seen by the participants

Its strength was that it gave us the opportunity to train our member companies on up-to-date technological solutions.
One of the main strength of our course was the instructors themselves.
Our instructors arrived from the everyday business life where they can sell their knowledge for an extra cost.
It's great to know for the participants that they have a professional organization that can provide such high-level trainings. It's good to belong such an SME organisation.

A big advantage of the course was that, although the represented businesses were small companies, but the participants were fully committed to improving themselves. The teachers took advantage of all this determination very well, giving the participants very incentive tasks, which constantly maintained the participants' interest.

Based on the completed evaluation forms, it can be concluded that the participants were largely satisfied with the training. The training was rated as a useful tool what encouraged them for further develop their networking and communication skills.
The training had the advantage that the instructors presented the course materials through numerous practical examples and the tasks prepared for the participants greatly helped the involvement of all participants.
Since most of the participants came from various professional member organizations of the IPOSZ, so the group covered a very wide circle and the training had a very serious added value that participants coming from far away from each other got to know the developments and problems experienced in other regions, and also the good examples.
One of the main strengths of the training was this organizational development effect.

The participants typically came from the professional organizations of IPOSZ, in which organizations the member companies are typically micro and small enterprises.

These member companies they carry out their business activities depending on the customer's needs and tasks, and although they tried to participate every training day, it unfortunately happened that some participants were unable to attend one or two training days or had to withdraw from the training after a while.

Main Findings and Conclusions

1.67% of companies operating in the Hungarian construction industry are medium enterprises, 5.52% are small enterprises and 92.3% are micro enterprises. And of this 92.3%, 90% are companies with less than 4 people. Typically, IPOSZ's membership comes from this circle of entrepreneurs. It is particularly a characteristic of construction micro-enterprises that they do not have such specialized knowledge, they do not have experts who could use the most up-to-date digital knowledge and applications within the enterprise.

After reviewing and discussing the materials received from project partners with our member organizations, the decision was made to carry out a Network and Communication Technology training, which is taking into account the specific solutions and programs widely used in Hungary today.
All the topic, the different solutions of the training are regularly updated. Therefore, it is very important that an instructors who know these solutions and programs well from time to time presents the latest little tricks, the latest solutions that help the SME owners in their networking and communication technologies.

With this training of the project, we set the goal of training 10-15 staff members and SME owners, with the knowledge acquired during the training that can help the construction companies in their daily operation and their development in digitalization.
After successful participation, the participants became able to apply sophisticated networking and communication technologies, programs to solve their job-specific tasks, as well as to assess the requirements and to choose appropriate solutions to problems.

Despite the fact that micro-enterprises have significantly smaller financial and human resources than large enterprises, they still see one of their possible breaking points if they educate themselves and became more digitalized in certain construction areas.
The target group we targeted with this training most of them already had a real, practical knowledge on Networking and Communication Technologies. They had the necessary pre-training knowledge in certain topics. The training was more than sixty hours long but with an extremely intensive practice-oriented way, in order to learn deeply special parts of the curriculum, in order to get real usable knowledge.
The weighting of the training topics in this way was confirmed by the positive feedback of the participants.
In addition to these conclusions, we must emphasize that much more projects, support, information and services are needed in order to speed up the catching up of the construction micro business sector to the digitalisation.
We are convinced that if we are not able to address the many thousands of family and micro businesses on a wider scale in time with appropriate training, digital training, then an

employment crisis may arise, as they will not be able to perform their construction work at a high level. Digitization is bringing new devices and technical solutions to the market and into the hands of wide circles of the population. Therefore, trainings in this direction, such as those implemented in our present project, can contribute to keep well-trained the micro enterprises working in the constrution.

The strength of the training, in our opinion, is exactly what we explained earlier, that we managed to attract staff members working with small companies from the most diverse professions in the construction sector on a regular daily base to the training. Another strength of the training was that we were able to do this taking into account the experiences of the international project partners.
For this training, the trainers basically came from the micro companies' world as we selected them on the recommendation of our member organizations. It was a very significant experience for us.

Hints for future use, suggestions for possible improvements or further developments
This is twofold, because different age groups approach it differently. It can be an advantage or a disadvantage that we were in a group, all ages together. The students' prior knowledge was different, but this also had positive consequences, since those who were less experienced learned a lot from how the more experienced ones did it.

The use of digital solutions in construction processes in the case of such small businesses sometimes exceeds their financial capabilities, although it is clear that most of the digital solutions are available for them and their use can be really effective for the micro companies. For some digital solutions, they need external service providers who can provide immediate assistance. Fortunately, profit-oriented companies nowadays offer solutions for this, but business associations such as IPOSZ are still often needed so that new solutions can reach to the right place at the right time.
It is an obvious fact that short-term, practice-oriented training courses, where small businesses can improve their digital skills, can help a lot here. There is still a need for more similar trainings offering industry-specific solutions in order to convince the masses of micro and small enterprises. For this, it would be very important to start state support programs in this area as well.

Will the training be continued by the partner in the future? For which target groups?
In the long term, our plans definitely include the organization of new training courses, involving a much wider range of the target group.

Although we can't tell when the course will continue, the Interior Designer Café, the Interior Designer Rendevú, which grew from the Tuesday training days into regular weekly meetings, will continue and the topic of these weekly meetings is often belongs to Network and Communication Technologies.
It is a club-like event that always has a theme.
What we were able to do in this project was to create the training material for a short-term practice-oriented training for our professional member companies in Network and Communication Technologies.

If our members associations want to carry out similar training in their own region or for other profession, than we can provide specialists and topics for their trainings. The extraordinary advantage of our industry associations' network is that our branch members usually have the necessary premises and infrastructure for such trainings and our network is nationwide.

We consider the training as a pilot training, since only a few of our member companies had the opportunity to join the training, those who on the one hand had the necessary basic digital knowledge and on the other hand were able to undertake to participate in the training.
In the long term, our plan is definitely to launch the organization of new training courses, involving a much wider range of the target group.

The training materials have been prepared and tested, the instructors/teachers are available, and if adequate financial support can be gained, this short-term training that has just been implemented can be implemented in many other times as well.
We have selected such instructors who are capable of holding similar trainings later in the future.

Such short-term training courses as we provided in this project must be strengthened in adult education. The experiences of this project could help making decision-makers aware of the need to finance similar short-term trainings for construction micro companies.

Testing digital Entrepreneuship training in Germany[6]

Introduction

After reviewing all the modules and our considerations of the regional conditions in the Schwerin Chamber of Crafts area and the companies based here, we decided in favour of the sub-modules:

- BME - EXA (old INF)
- PROLET - CAD 1
- DCM - DCT (specialising in 3D printing and scanning)

Implementation period

We started the individual courses at different times to give participants the opportunity to take part in several courses.

The courses were organised as follows.
26.08.2024 bis 24.01.2025 mit dem Kurs EXA
17.09.2024 bis 31.01.2025 mit CAD1 und am
10.09.2024 bis 29.01.2025 mit DCT (in Teilen)

These courses were carried out as further or advanced training and do not correspond to any categorisation according to the EQF.

[6] Created by Jens Dettmann, Handwerkskammer Schwerin, Germany

Special features of the project

The materials prepared by the partner were largely used to prepare and plan the implementation of the course modules.
The content was customised to the needs of the participants. SMEs in the chamber area need to be made even more aware of the opportunities offered by digitalisation. In most cases, we were told that the companies function as they have for years and do not need to adapt with the help of digitalisation.

Acceptance and organisation of the training

The main target group for the training modules were employees and managers of SMEs in the skilled trades, with a focus on ancillary construction trades. The participants should be involved in work processes in their daily working life where there are opportunities for digitalisation. Another focus was on junior managers, training officers and administrative staff at the companies.

Our project staff used the contacts that already existed through the consultations on the BP catalogue. In addition, the courses were advertised by our company advisors and the digitisation officer of the Schwerin Chamber of Crafts.
Unfortunately, we had to realise that the willingness of the companies to send employees to the training courses was very low. The main reason for this was that the order situation is good and the employees are needed in the company.
For this reason, we also included trainers from training service providers in the course. They will act as multipliers in their daily work in contact with the companies.

Number of teaching hours, scope of self-study

The training began with a kick-off event in the 'CraftLab' innovation room at the Schwerin Chamber of Crafts.

The actual lessons were realised as follows:

EXA (alt INF)	PC-Kabinette	80 UE (Teaching units)
CAD 1	CraftLab	208 UE
DCT (in Teilen)	CraftLab und PC-Kabinet	160 UE

The lessons included very little self-study, as the participants were all working and the course was an additional burden alongside work and family.
Voluntary assignments were given for self-study to be discussed the next day.

Organisation of the implementation

The lecturers used the documents from the project partner PP2 Hochschule 21 for planning and lesson preparation.
It quickly became apparent that the content had to be adapted to the clientele of the Schwerin Chamber of Crafts. The current conditions of the construction companies in the chamber district were also taken into account.
The individual modules were carried out in our training and technology centre in Schwerin Süd. The newly created CraftLab (innovation room for digitalisation) was mainly used here.
PC-Unterrichtsraum Labor (3D / Video u.a.)

Each of the 3 modules was taught by a different specialist lecturer.
BME - EXA (old INF) was conducted by Mr R. Rott. Mr Rott has been working for the training and technology centre of the Chamber of Crafts for more than 8 years. As an IT specialist SI, he specialises in CAD/CNC and MS Office software applications.
PROLET - CAD 1 was taught by Dipl.Ing. A. Sander, who has been working in adult qualification and for an architectural office for 10 years.
DCM - DCT (focus on 3D printing and scanning) was taught by our colleague Mr D. Zapel. Mr Zapel is also our coordinator for the innovation room 'CraftLab'.

The lecturers gave the participants plenty of time for questions and explanations. The atmosphere during the courses was open-minded and tension-free. The participants felt well looked after and understood.

There were 11 participants on the **BME - EXA** (old INF) course, which was made up as follows

There were 9 participants in the **PROLET - CAD 1** course, which was made up as follows

Category	Number of participants
older 60 years	1
30 - 60 years	8
male	6
female	3
German	9
Main building trade	2
Training/instruction as main activity	4
Secondary building trade	3

Category	Number of participants
older 60 years	2
30 - 60 years	9
male	6
female	5
German	11
Main building trade	2
Training/instruction as main activity	7
Secondary building trade	2

There were 5 participants in the **DCT** course (in parts), the course was made up as follows

Category	Number of participants
Younger 30	2
30 - 60 years	3
male	4
female	1
German	5
Main building trade	1
Training/instruction as main activity	0
Secondary building trade	4

Realisation of the training

The training courses took place at the Schwerin Chamber of Crafts' Education and Technology Centre.

The curricula were based on the syllabuses of the project partner University 21 from Buxtehude.

The content was adapted according to the participants present and their professional background, so that optimal learning success could be achieved and each participant could take a lot of new knowledge back to their company.

The 3 training courses each focussed on specific topics. The training programme was adapted to the needs of the participants around these topics.

BME – EXA (alt INF)
The focus here was on the use of MS Office EXCEL in order to be able to use the programme for more than just calculating. In addition, the participants were familiarised with the application possibilities of MS Office OUTLOOK in order to be able to use it in a broader spectrum. The participants were also introduced to the possibilities of the Artesa craftsman software (see BP).
PROLET – CAD 1
The focus of these 208 teaching units was on learning and using the **Inventor and Fusion 360** software. The first design drawings were also created.
DCM – DCT
In this module, only the content from the field of 3D printing and scanning was taught. Technology from HP, Shaper and Leica was used.





Due to the problem of recruiting a uniform group of participants in the companies, it was difficult to motivate all participants to attend every class.

The majority of the course participants were then able to fulfil their work obligations at the company, although many events were scheduled for the late afternoon.

With a longer lead time and a broader awareness of the courses, we are guaranteed to be able to put together a group of participants who attend the course intensively and can therefore take away much more for their company.

As we had already requested the evaluation forms during the courses in order to provide them to our project partner Hochschule 21 for evaluation, we carried out another round of feedback with the participants on the last day of the courses.

The participants came to the conclusion that the courses are interesting and have a lot of potential for really interested participants.

The lecturers and trainers also took part in the survey.

They came to a similar conclusion. And they are prepared to take the knowledge they have gained with this clientele into account when repeating the courses.

Certificates were not issued as the courses were held without a final test. This was discussed with the participants in advance, as some of them expressed fear of taking the test right from the start.

Observations and opinions of lecturers

The course participants took an active part in the classroom discussions. They also asked questions that related to their daily work in the company. The atmosphere during the training was friendly and interested, which had a positive effect on the teaching and knowledge transfer.

The participants showed a clear interest in the topic.

Strengths of the training in the eyes of the participants

In the concluding feedback discussions, all participants spoke positively about the opportunities offered by the Chamber of Crafts' Education and Technology Centre. The CraftLab in particular offered many opportunities to organise interesting lessons. It was particularly well received that CAD and 3D courses were interlinked and that drawings were also printed.

Weaknesses of the training in the eyes of the participants

The classes should be organised more according to existing knowledge and trades. For example, main construction trades (structural/civil engineering), ancillary construction trades (finishing, electrical, heating, plumbing, etc.) or management/administration/calculation.

Key findings and conclusions

In order to be able to organise these courses in the short and medium term, we will focus the content more on the group of people working in the trade and not on management. It will be more about practical application in order to make day-to-day work easier and more efficient. In this way, the knowledge process of the many possibilities of digitalisation, especially in small companies, should also be brought to the management by the company's own employees.

Due to the business landscape in the Schwerin chamber district, we will advertise future training courses more to companies in the ancillary building trades.
Thanks to the workshops already available at the Education and Technology Centre, we will be able to offer training in the areas of electricity, wood, painting/paint, heating/sanitation and digitalisation (CraftLab). In addition to theoretical training, a link to practice can also be established.

5. Evaluation Concept[7]

Introduction

The focus of evaluation depends on goals of the process evaluated. Concerning the evaluation also further aspects such as Timeline and the opportunity to impact is to be considered. In common, evaluations tend to be multilevel and have a look at both towards and backwards. The aim of the evaluation is to support implementing and improving of the entrepreneurship education, thus, the evaluation is multilevel, and the focus is on issues that we have an opportunity to impact on.

The evaluation should be scheduled so, that the whole course is still in the memory of respondents. If the course is single activity like lecture, practical training, or e-learning session, this is no problem. The evaluation survey or interview can be conducted immediately after the training without any risk on confusions concerning the target of the evaluation. But if there are more activities, the course lasts weeks or months, or consists of many meetings with certain interval, the risk of bias, caused by uncertainty about which part the survey or interview deals with, increases. This means that in such cases either the survey should be conducted separately after each phase or questions should be written so, that the risk of bias becomes minimized.

The process

In best cases, the evaluation survey and the report cover the evaluated study modules. This is not always possible, because e.g., parts of the study course are quite different from each other. In such cases, it is recommendable to conduct the evaluation and write the report separately in each study modules to avoid bias caused by time. These individual reports can then be summarised in concluding report.

This evaluation concept covers different types of courses. Some of these can be evaluated as a whole, but some can be evaluated only partially. However, the evaluation method and tools are similar in each case.

The evaluation is planned to be conducted in paper form as well as using the online survey application Zensus. Both of them enable the anonymity of the respondents. The participants or educational Institutes can decide themselves which way of evaluation they want to use.

The Evaluation process should follow the concept:

[7] Compiled by Tamas Ferenczi (M.Sc.) and Andreas D. Weise (Prof. Dr.-Ing.), Buxtehude University of Applied Sciences (HS21)

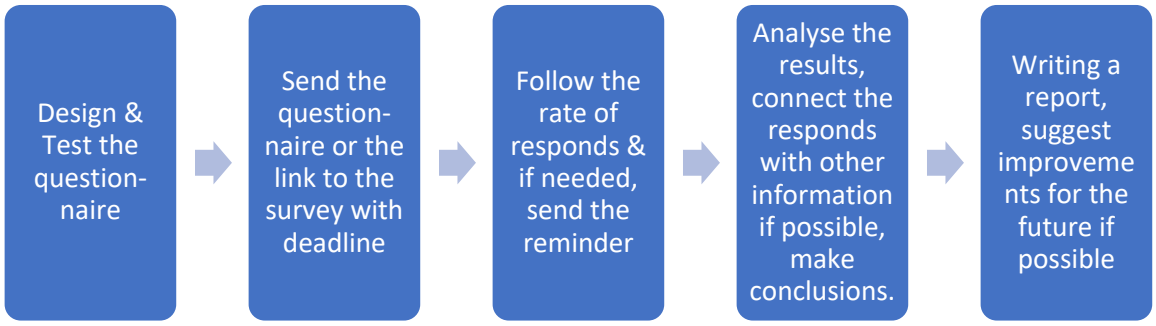


Figure 1: Evaluation Prozess

Target groups of the evaluation

The main target group is those participating the study courses, i.e., students, companies, SMEs participating the course and lecturers.

Questionnaires and duties of each test facilitator

The questionnaires will be prepared course by course. The finishing of each questionnaire will be made when the programme of the course to be tested and evaluated is available (Table 1). The facilitator of the test sends the programme to HS21 early enough so that HS21 has at least two weeks to finish the questionnaire for the training in question. HS21 will send the links to each questionnaire to the facilitator who delivers the links and instructs the target groups to complete the questionnaire. The questionnaire will be also prepared to be printed in pdf and will send out to the facilitator to be printed and then to hand out to the participants.

Needs to translate the questionnaire?

If the questionnaire needs to be translated to domestic language, a facilitator should announce this at least 2 weeks before the training starts. HS21 will then send a preliminary questionnaire of each target group to be translated. Facilitator will send the translated (or proofed, if HS21 has made the translation) version to HS21 together with the training programme latest two weeks before the planned test course starts.

When the course starts

In the beginning of each course, the facilitator informs, that the course will be evaluated, and that participants will receive a link to the evaluation questionnaire in the end of the course. Participants should be informed that the evaluation helps the facilitators to develop and improve the course in the future.

When the course ends

In the end of the course, facilitator gives the link to the survey to students, or hands out the questionnaire in printed form, reminding them that each answer is important, and informs the period when the evaluation survey is active. It is recommended that Questionnaires online as well es in printed form be filled out immediately. One participant should fill the questionnaire only once. After one week the responding period will be finished. Also, teachers and employers should be given links to their own surveys, if such are required in the training in question.

After the responding period has finished, HS21 will collect the results from the online system, analyse them and write a report. Printed questionnaires filled by participants must be scanned and sent to HS21 via Email within the responding period. HS21 will take these also into the analysis.

Table: Summary of the duties, process and schedule of the test

Deadline and responsible party	Task
Latest two (1) weeks before the start of the course / training facilitator of the course should	• inform HS21 about the schedule of the course, • inform HS21 whether the questionnaires should be translated or not. If translation is needed, return the questionnaires included with translations written on the form. • send HS21 a brief info about the curricula (only **names** and **e-mail addresses** of the teachers, and **topics** they will teach are required).
Within two (1) weeks calculated from receiving the information listed above, HS21 will	• create the specific survey for this course, • translate the questionnaire • send the links to surveys to the facilitator and inform the deadline for the responding. • Send the questionnaires via Email to be printed.
When the course starts, facilitator will Inform the participants, teachers, and enterprises that	• the course will be evaluated, • the link to the evaluation survey or the questionnaires in printed form will be given in the end of the course or phase of the course, and • that it is important for developing the course that everyone complete the questionnaire once!
When the course or phase of the course ends, facilitator will	• deliver the links to survey to each group of respondents (participants, teachers, enterprises) either by e-mail or in other acceptable way • give the opportunity to fill out the questionnaires in paper form • inform the respondents about the deadlines, and • remind them about the importance of the evaluation. • Scan the printed questionnaires filled by participants and send to HS21 via Email within the responding period.
When the given deadline has been passed, HS21 will	• receive all scanned printed questionnaires filled by participants in paper form • open the online database and collect and analyse the results, • write a report, and • send the report to be discussed.

The report

In the report, following issues will be reported: A rough description of the group of respondents, have they been satisfied with the facilitations, topics, teachers, and their group, do they believe that the training has been beneficial, and what could have been made in other way. Furthermore,

in certain courses and trainings also teachers' and employers' opinions will be surveyed and reported. These cases will be agreed together and announced separately.

In the end of each report there will be a concluding section that summarizes the findings and gives some suggestions concerning the opportunities to improve and develop the curriculum and / or facilitations. If wanted and agreed, all the evaluations will be summarized together.

Appendices

Appendix A The template of the questionnaire for students of the education

A1. Background information

1.1. In which country did you take education course?

◯ Germany ◯ Hungary ◯ Poland

◯ Latvia ◯ Finland

◯ Other Country: .....

1.2. What is the name of the course that you have attended?

.....
.....

1.3. What is your highest education?

◯ Doctor or resp. ◯ Master of Science ◯ Bachelor

◯ Master VET ◯ Vocational Education ◯ Matriculation Exam

◯ Comprehensive School ◯ None

1.4. Employment: At the moment you are

◯ working ◯ studying ◯ unemployed

◯ retired ◯ other: .....

1.5. In which branch you are / were / will be working or studying

◯ Education and training ◯ Consulting ◯ Construction

◯ Finishing ◯ Electrician ◯ Plumber

◯ Architect ◯ Construction Eng. ◯ Electrical Eng.

◯ Piping Eng. ◯ Public Authority ◯ Other: .....

1.6. Experience in the branch

◯ 0 - 5 years ◯ 6 - 10 years

◯ 11 - 20 years ◯ More than 20 years

1.7. Age: At the moment you are

◯ Less than 30 year old ◯ 30 – 60 year old ◯ More than 60 year old

1.8. Gender: Are you

◯ Female ◯ Male ◯ Other ◯ Do not want to say

A2. <u>For each study module and course</u>

2.1. Facilitations:

	Very suitable	Suitable	Quite ok	Could had been better	Not suitable
The Place for the course was	◯	◯	◯	◯	◯
The time (Date) of the course was	◯	◯	◯	◯	◯
The length of the course was	◯	◯	◯	◯	◯
The schedule of the course was	◯	◯	◯	◯	◯
The facilitations (room, equipment etc) were	◯	◯	◯	◯	◯

2.2. In common, the topics were (5 choices max):

◯ Topical ◯ Interesting ◯ Important

◯ Close to my needs ◯ Up to date ◯ Boring

◯ Out-of-date ◯ Unnecessary

2.3. In common, the lecturers (5 choices max):

◯ Used interesting and motivating methods ◯ Dealt with important topics

◯ Were professionals in their branch ◯ Met the expectations

◯ Were up-to-date ◯ Were boring

◯ Were out-of-date ◯ Wandered off the point

2.4. In general

	Abso-lutely true	True	Hmm, quite ok	Not true
The information given was up to date	○	○	○	○
The presentation was clear and understandable	○	○	○	○
There was time enough for the topic	○	○	○	○
There was time enough for dis-cussion	○	○	○	○
The tasks given were clear and understandable	○	○	○	○
The atmosphere in the course / lessons was good and open.	○	○	○	○
The workload was adequate	○	○	○	○

2.5. Course content and structure

	Very good	good	Hmm, quite ok	Not ok
Course structure	○	○	○	○
Used tools and Resources (Presenta-tion, black board notes, digital tools)	○	○	○	○
Learning Materials (Script, Handouts)	○	○	○	○
Quality of study course in summary	○	○	○	○
Course content overview	○	○	○	○
Estimated time for the lessons	○	○	○	○
Scope of teaching content	○	○	○	○

2.6. Evaluation of the lecturer

	Very good	good	Hmm, quite ok	Not ok
Study method fits to the content (Group-work, discussion forum)	○	○	○	○
Interesting, descriptive explanation of study contents	○	○	○	○
Direct connection between theory and praxis, by practical examples	○	○	○	○
Friendliness and kindness of the lecturer	○	○	○	○
Handling of questions, critics and objec-tions	○	○	○	○

Reliability on meetings and agreements	◯	◯	◯	◯
Availability of lecturer in case of questions	◯	◯	◯	◯

2.7. What would you like to say to teachers / facilitators. What could have done better, what should not be changed etc. Do you have any suggestions for improving the spatial and/or technical equipment?

Appendix B The template of the questionnaire for lecturers

B1. <u>Background information</u>

1.1. In which country did you did you educated the study course?

◯ Germany ◯ Hungary ◯ Poland

◯ Latvia ◯ Finland

◯ Other Country: .....

1.2. What is the name of the course that you have lectured?

.....
.....

1.3. What is your highest education?

◯ Professor ◯ Doctor or resp ◯ Master of Science

◯ Bachelor ◯ None ◯ Other:.....

1.4. Employment: At the moment you are

◯ working ◯ studying ◯ unemployed

◯ retired ◯ other: .....

1.5. In which branch you are / were / will be working or studying

◯ Higher Education ◯ Consulting ◯ Construction
◯ Finishing ◯ Management ◯ Construction Eng.
◯ Architect ◯ Electrical Eng. ◯ Piping Eng.
◯ Public Authority ◯ Other: .....

1.6. Experience in the branch

◯ 0 - 5 years ◯ 6 - 10 years
◯ 11 - 20 years ◯ More than 20 years

1.7. Age: At the moment you are

◯ Less than 30 year old ◯ 30 – 60 year old ◯ More than 60 year old

1.8. Gender: Are you

◯ Female ◯ Male ◯ Other ◯ Do not want to say

B2. <u>For each study module and course</u>

2.1. Facilitations:

	Very suitable	Suitable	Quite ok	Could had been better	Not suitable
The Place for the course was	◯	◯	◯	◯	◯
The time (Date) of the course was	◯	◯	◯	◯	◯
The length of the course was	◯	◯	◯	◯	◯
The schedule of the course was	◯	◯	◯	◯	◯
The facilitations (room, equipment etc) were	◯	◯	◯	◯	◯

2.2. In common, the students (5 choices max):

◯ Were interested and motivated in learning new methods
◯ Had experience in their branch ◯ Have participated in discussions
◯ Had enough pre knowledge ◯ Were bored
◯ Were not qualified enough for the course ◯ Had no attention

2.3. In general

	Abso-lutely true	Gener-ally true	Partially true	Not true
There was time enough for the topic	○	○	○	○
There was time enough for the discussion	○	○	○	○
The tasks given were clear and understandable	○	○	○	○
The atmosphere in the course / lessons was good and open.	○	○	○	○
We had a good team spirit	○	○	○	○
Different methods were used e.g. groupwork, discussion fo-rum,	○	○	○	○
Different practical examples were presented and discussed	○	○	○	○
Different learning tools were used e.g. PowerPoint slides, online learning platform, Videos etc.	○	○	○	○

2.4. What could have done better, what should not be changed etc. Do you have any suggestions or lessons learned for improving the spatial and/or technical equipment?

6. Evaluation Report[8]

Introduction

The focus of evaluation depends on goals of the process evaluated. Concerning the evaluation also further aspects such as Timeline and the opportunity to impact is to be considered. In common, evaluations tend to be multilevel and have a look at both towards and backwards. The aim of the evaluation is to support implementing and improving of the entrepreneurship education; thus, the evaluation is multilevel, and the focus is on issues that we have an opportunity to impact on.

The evaluation should be scheduled so, that the whole course is still in the memory of respondents. If the course is single activity like lecture, practical training, or e-learning session, this is no problem. The evaluation survey or interview can be conducted immediately after the training without any risk on confusions concerning the target of the evaluation. But if there are more activities, the course lasts weeks or months, or consists of many meetings with certain interval, the risk of bias, caused by uncertainty about which part the survey or interview deals with, increases. This means that in such cases either the survey should be conducted separately after each phase or questions should be written so, that the risk of bias becomes minimized.

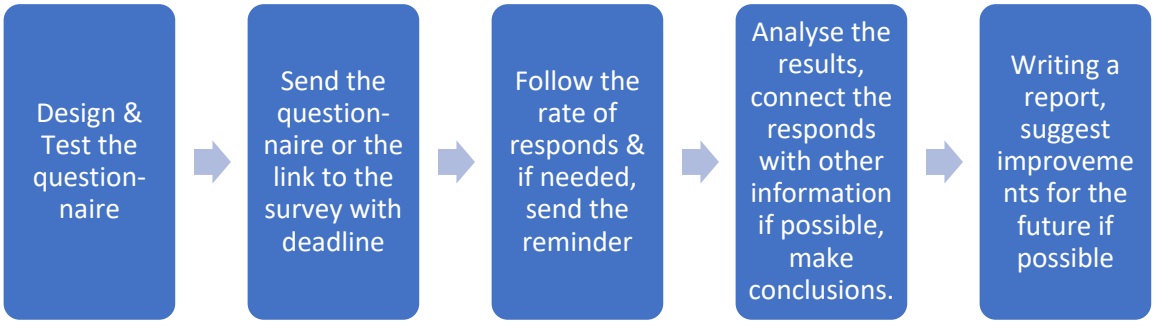
The process

In best cases, the evaluation survey and the report cover the evaluated study modules. This is not always possible, because e.g., parts of the study course are quite different from each other. In such cases, it is recommendable to conduct the evaluation and write the report separately in each study modules to avoid bias caused by time. These individual reports can then be summarised in concluding report.

This evaluation concept covers different types of courses. Some of these can be evaluated as a whole, but some can be evaluated only partially. However, the evaluation method and tools are similar in each case.

The evaluation is planned to be conducted in paper form as well as using the online survey application Zensus. Both of them enable the anonymity of the respondents. The participants or educational Institutes can decide themselves which way of evaluation they want to use.

The Evaluation process should follow the concept:



[8] Compiled by Tamas Ferenczi, Buxtehude University of Applied Sciences, Germany

Figure 2: Evaluation Prozess

Target groups of the evaluation

The main target group is those participating the study courses, i.e., students, companies, SMEs participating the course and lecturers.

Questionnaires and duties of each test facilitator

The questionnaires will be prepared course by course. The finishing of each questionnaire will be made when the programme of the course to be tested and evaluated is available (Table 1). The facilitator of the test sends the programme to HS21 early enough so that HS21 has at least two weeks to finish the questionnaire for the training in question. HS21 will send the links to each questionnaire to the facilitator who delivers the links and instructs the target groups to complete the questionnaire. The questionnaire will be also prepared to be printed in pdf and will send out to the facilitator to be printed and then to hand out to the participants.

Needs to translate the questionnaire

If the questionnaire needs to be translated to domestic language, a facilitator should announce this at least 2 weeks before the training starts. HS21 will then send a preliminary questionnaire of each target group to be translated. Facilitator will send the translated (or proofed, if HS21 has made the translation) version to HS21 together with the training programme latest two weeks before the planned test course starts.

When the course starts

In the beginning of each course, the facilitator informs, that the course will be evaluated, and that participants will receive a link to the evaluation questionnaire in the end of the course. Participants should be informed that the evaluation helps the facilitators to develop and improve the course in the future.

When the course ends

In the end of the course, facilitator gives the link to the survey to students, or hands out the questionnaire in printed form, reminding them that each answer is important, and informs the period when the evaluation survey is active. It is recommended that Questionnaires online as well es in printed form be filled out immediately. One participant should fill the questionnaire only once. After one week the responding period will be finished. Also, teachers and employers should be given links to their own surveys, if such are required in the training in question.

After the responding period has finished, HS21 will collect the results from the online system, analyse them and write a report. Printed questionnaires filled by participants must be scanned and sent to HS21 via Email within the responding period. HS21 will take these also into the analysis.

Table: Summary of the duties, process and schedule of the test

Deadline and responsible party	Task
Latest two (1) weeks before the start of the course / training facilitator of the course should	• inform HS21 about the schedule of the course, • inform HS21 whether the questionnaires should be translated or not. If translation is needed,

	return the questionnaires included with translations written on the form. • send HS21 a brief info about the curricula (only **names** and **e-mail addresses** of the teachers, and **topics** they will teach are required).
Within two (1) weeks calculated from receiving the information listed above, HS21 will	• create the specific survey for this course, • translate the questionnaire • send the links to surveys to the facilitator and inform the deadline for the responding. • Send the questionnaires via Email to be printed.
When the course starts, facilitator will Inform the participants, teachers, and enterprises that	• the course will be evaluated, • the link to the evaluation survey or the questionnaires in printed form will be given in the end of the course or phase of the course, and • that it is important for developing the course that everyone complete the questionnaire once!
When the course or phase of the course ends, facilitator will	• deliver the links to survey to each group of respondents (participants, teachers, enterprises) either by e-mail or in other acceptable way • give the opportunity to fill out the questionnaires in paper form • inform the respondents about the deadlines, and • remind them about the importance of the evaluation. • Scan the printed questionnaires filled by participants and send to HS21 via Email within the responding period.
When the given deadline has been passed, HS21 will	• receive all scanned printed questionnaires filled by participants in paper form • open the online database and collect and analyse the results, • write a report, and • send the report to be discussed.

The report

In the report, following issues will be reported: A rough description of the group of respondents, have they been satisfied with the facilitations, topics, teachers, and their group, do they believe that the training has been beneficial, and what could have been made in other way. Furthermore, in certain courses and trainings also teachers' and employers' opinions will be surveyed and reported. These cases will be agreed together and announced separately.

In the end of each report there will be a concluding section that summarizes the findings and gives some suggestions concerning the opportunities to improve and develop the curriculum and / or facilitations. If wanted and agreed, all the evaluations will be summarized together.

The results of the evaluation

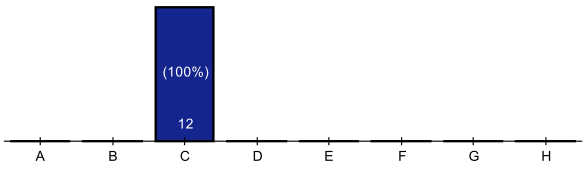
In this report, the results of evaluations of three test course implemented in Latvia, Germany (HWKS, Schwerin), and Germany (HS21, Buxtehude) will be reported. The course-specific findings will be first presented and summarized, and after this, there will be a concluding section that summarizes the findings and gives some suggestions concerning the opportunities to improve and develop the curriculum and / or facilitations.

Latvia - Latvian Chamber of Commerce and Industry in Riga

Course: DBM - Digital Business Management & Economics

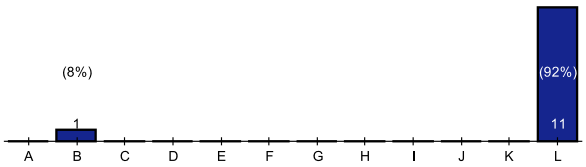
Participants – Students

Demography



1.3. What is your highest education?
A Doctor or resp. (0)
B Master of Science (0)
C Bachelor (12)
D Master VET (0)
E Vocational Education (0)
F Matriculation Exam (0)
G Comprehensive School (0)
H None (0)

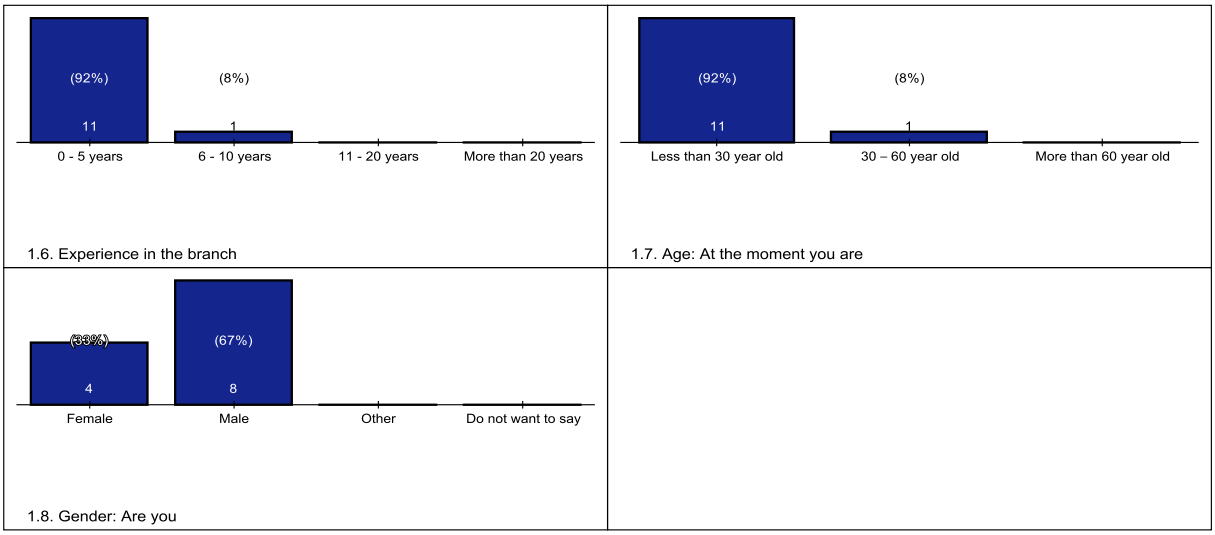
1.4. Employment: At the moment you are



1.5. In which branch you are / were / will be working or studying
A Education and training (0)
B Consulting (1)
C Construction (0)
D Finishing (0)
E Electrician (0)
F Plumber (0)
G Architect (0)
H Construction Eng. (0)
I Electrical Eng. (0)
J Piping Eng. (0)
K Public Authority (0)
L Other: (11)

Answers for other employment

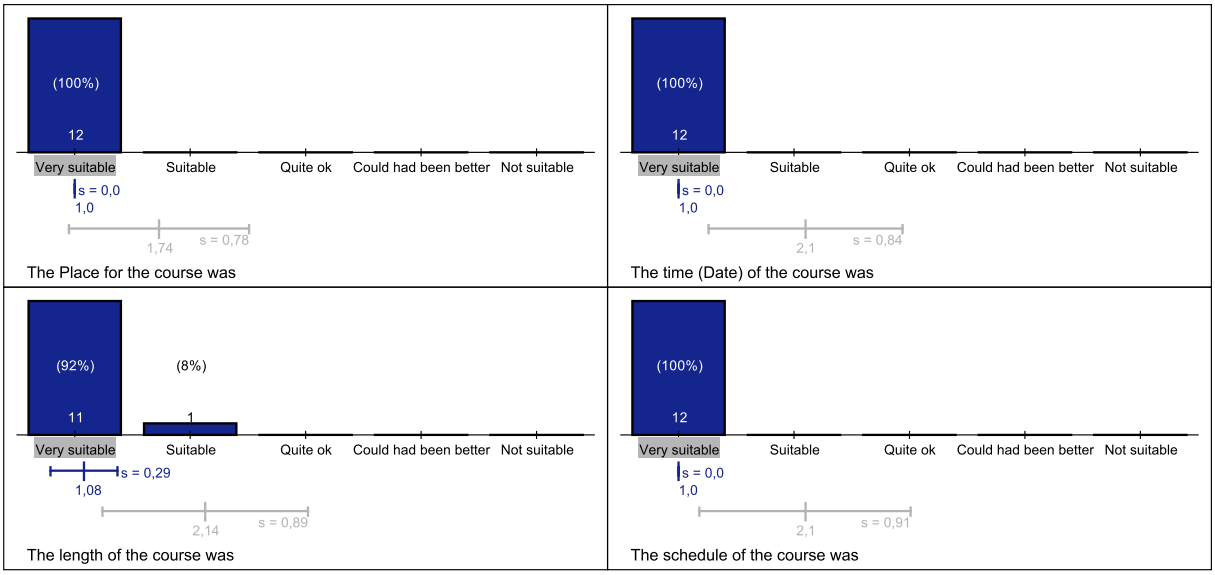
- Marketing
- Marketing & Sales
- Marketing and sales
- Marketing and Sales

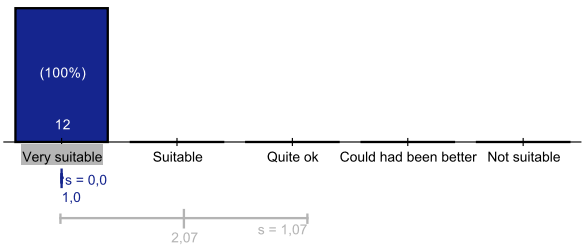


The evaluation survey was responded by 12 students who participated the study module. The age distribution of students skews towards youth, under 30 years old (92%) and falling within the age range between 30 and 60 years (8%). In terms of gender representation, males dominate the sample with proportion of 67%. 50% of students are currently engaged in working as employees, meanwhile 50% of students are trainees or self-employed.

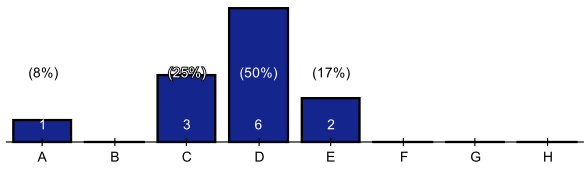
In terms of field of study or work, all students are working in the marketing and sales Section. 92% of the participants have less than 5 years working experience, 8% have 6-10 years' experience in the branch.

For each study module and course



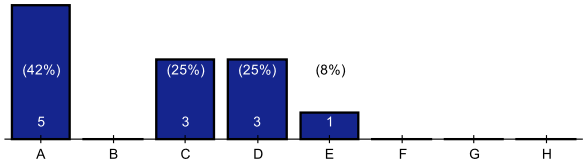


The facilitations (room, equipment etc) were

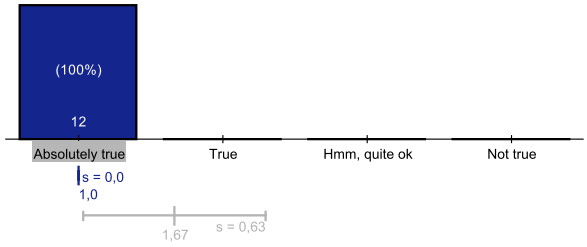


2.2. In common, the topics were (5 choices max):
A Topical (1)
B Interesting (0)
C Important (3)
D Close to my needs (6)
E Up to date (2)
F Boring (0)
G Out-of-date (0)
H Unnecessary (0)

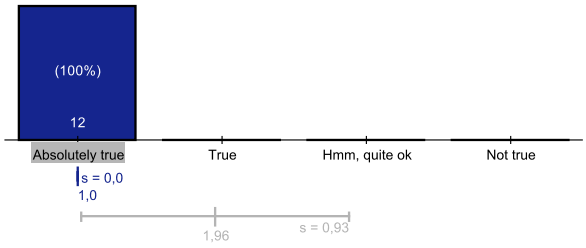
Responses collected indicate a positive sentiment among students towards their learning experiences during the educational block. The students are agreed that the information in the course was important and up to date. They appreciated the atmosphere in the lessons, along with sufficient time allocated for the topic.



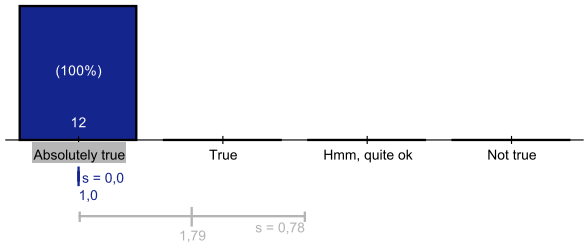
2.3. In common, the lecturers (5 choices max):
A Used interesting and motivating methods (5)
B Dealt with important topics (0)
C Were professionals in their branch (3)
D Met the expectations (3)
E Were up-to-date (1)
F Were boring (0)
G Were out-of-date (0)
H Wandered off the point (0)



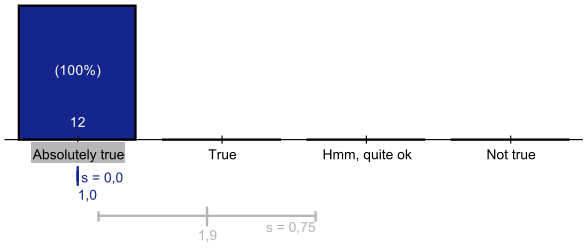
The information given was up-to-date



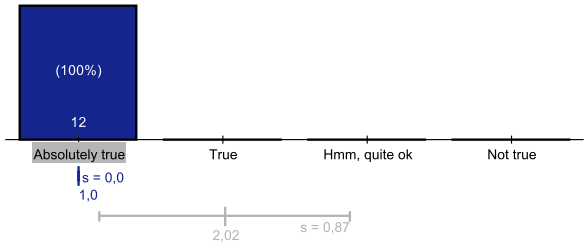
The presentation was clear and understandable



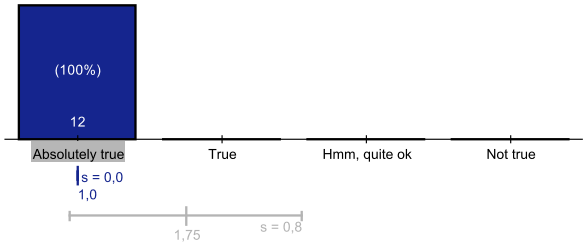
There was time enough for the topic



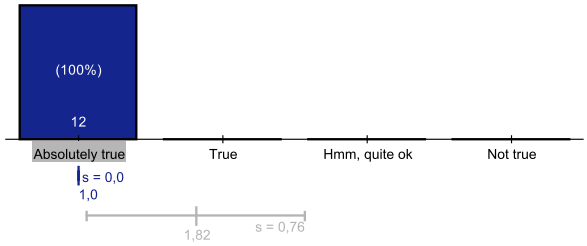
There was time enough for the discussion



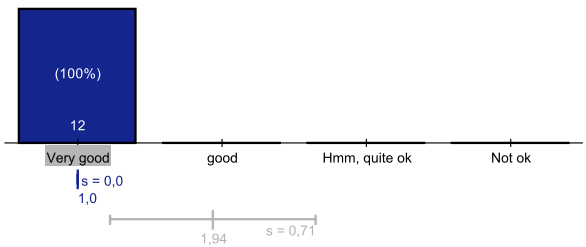
The tasks given were clear and understandable



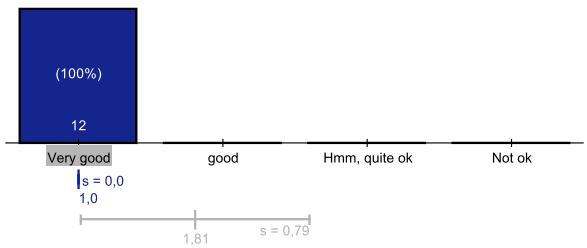
The atmosphere in the course / lessons was good and open.



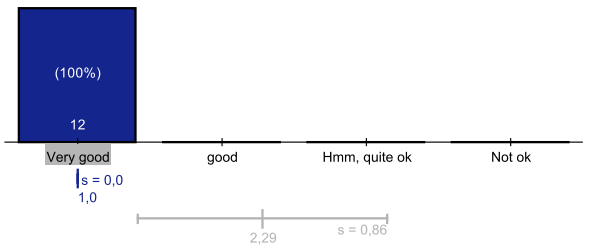
The work load was adequate



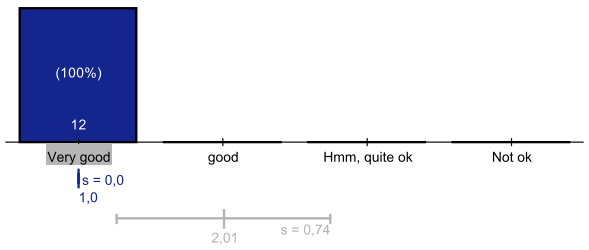
Course structure



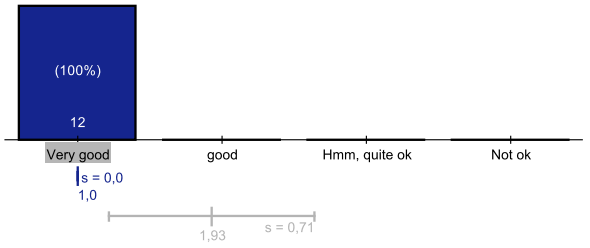
Used tools and Resources (Presentation, black board notes, digital tools)



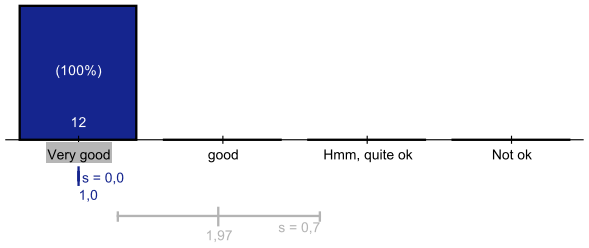
Learning Materials (Script, Handouts)



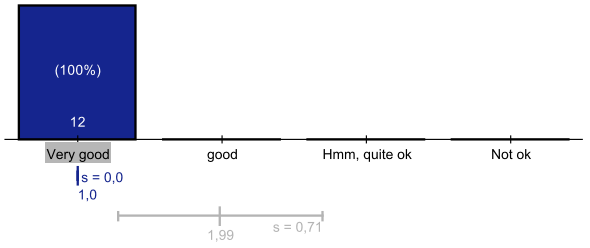
Quality of study course in summary



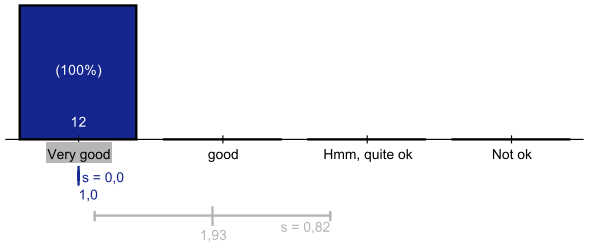
Course content overview



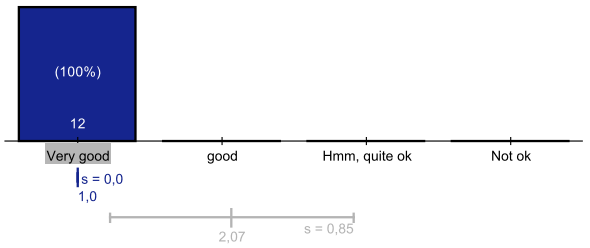
Estimated time for the lessons



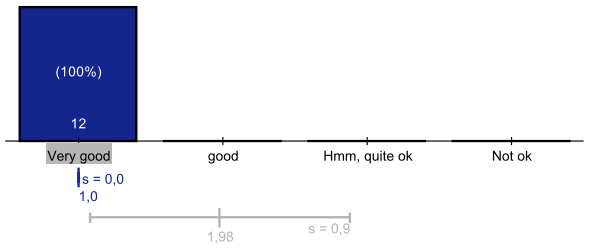
Scope of teaching content



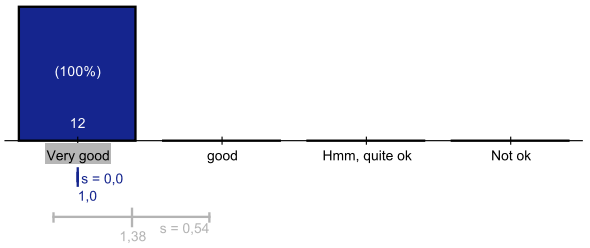
Study method fits to the content (Groupwork, discussion forum)



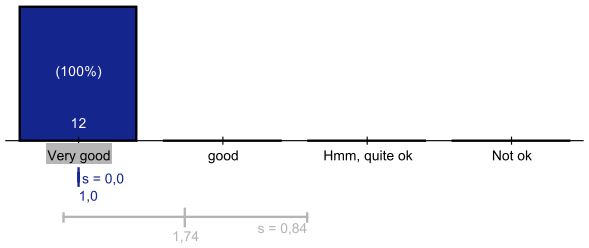
Interesting, descriptive explanation of study contents



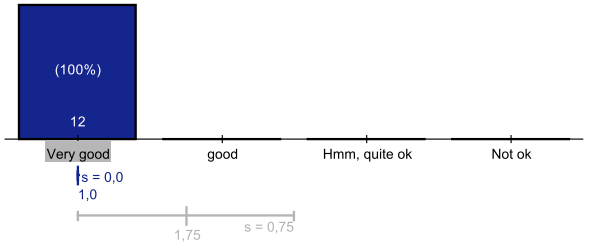
Direkt connection between theory and praxis, by practical examples



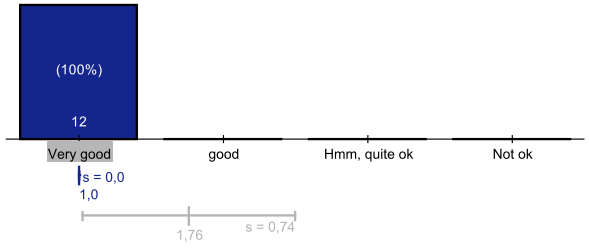
Friendliness and kindness of the trainer



Handling of questions, critics and objections



Reliability on meetings and agreements



Availability of trainer in case of questions

Free form answers

What would you like to say to teachers / facilitators. What could have been better, what should not be changed etc. Do you have any suggestions for improving the spatial and/or technical equipment?

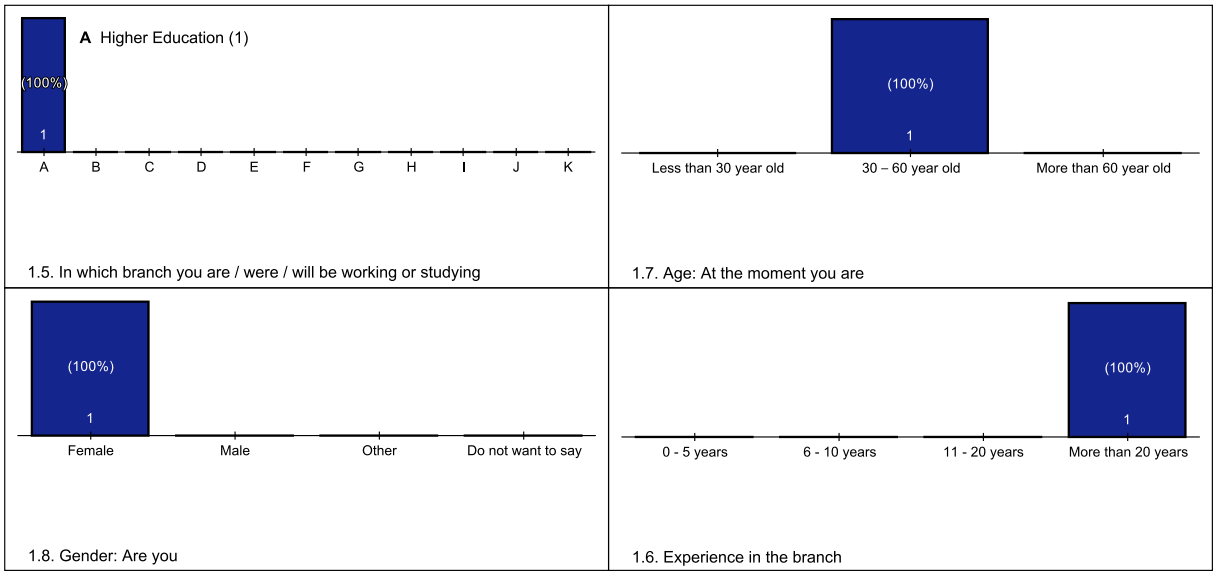
- *Everything was well organized*
- *I am satisfied*
- *I learned a lot of new and useful things*
- *It was interesting*
- *No, everything was really good*
- *Nothing.*
- *Thank you (2x)*
- *Thank you!*
- *Thank you for the interesting course*
- *Thank you, it was good*
- *Thank you, it was useful. Everything was good.*

Conclusion

In summary, students generally expressed a high level of satisfaction with all courses, positively evaluated their own learning experience. Participants have gained modern, up-dated Business Management Skills.

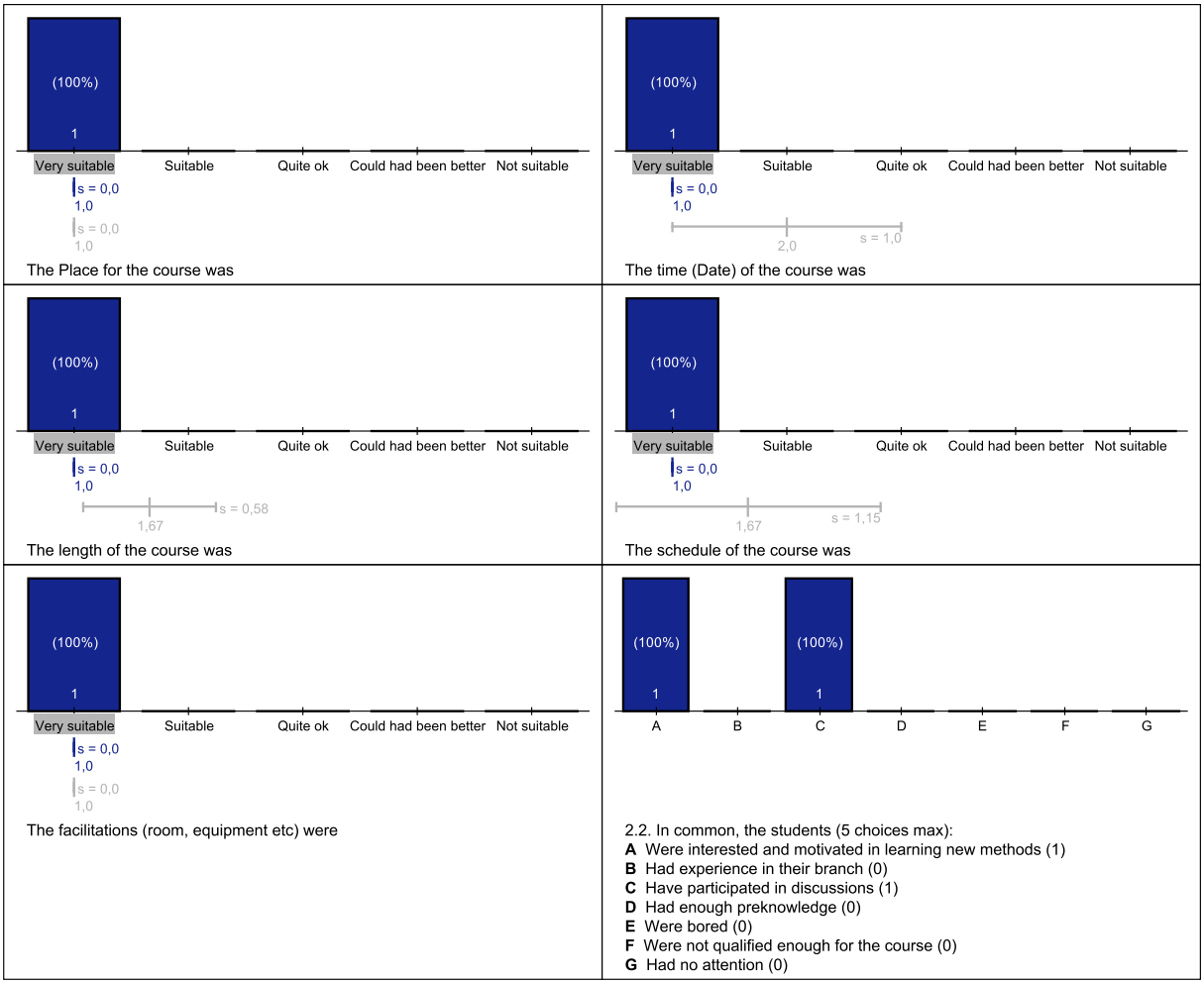
Lecturer

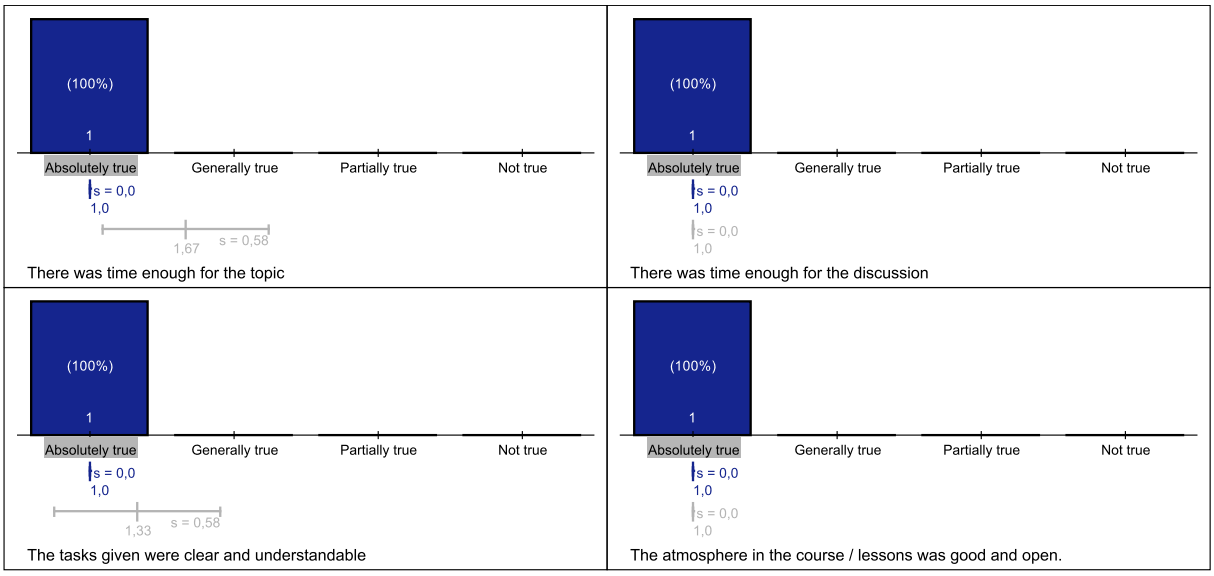
Demography

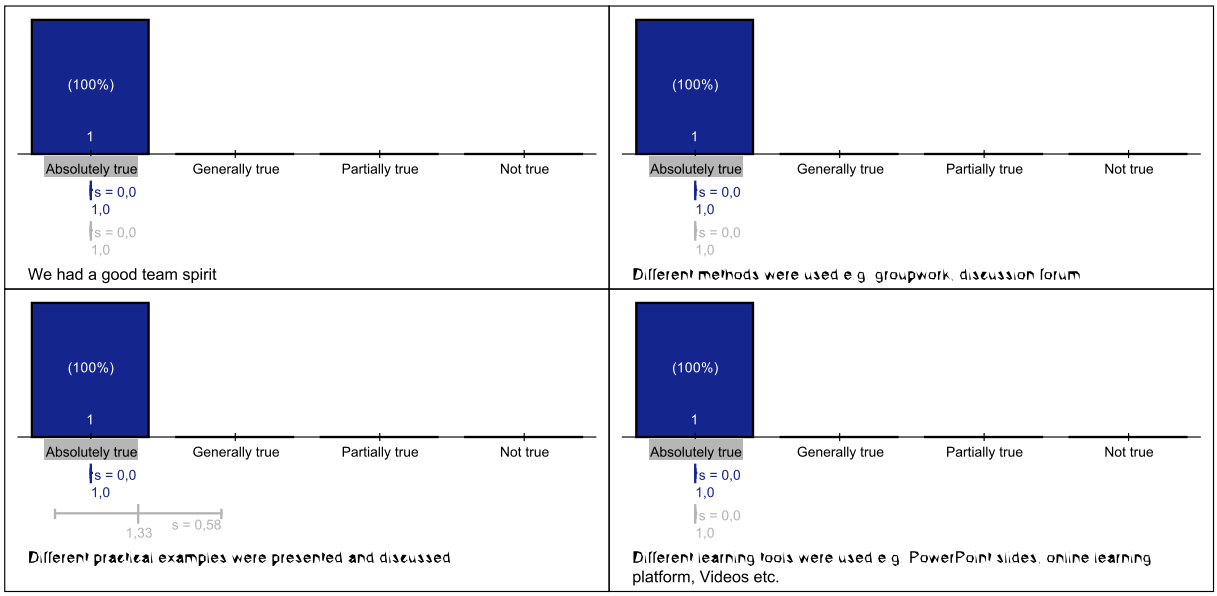


In Latvia, one teacher completed the questionnaire. This lecturer was a lecturer in Higher Education, having more than 20 years of experience in branch, and age between 30 and 60 years. According to her, the facilitations (place, time etc.) were excellent. The students also seemed to have required basic knowledge about the topic and have participated in discussions and seemed to be satisfied with the lessons.

Educational Block







Conclusion

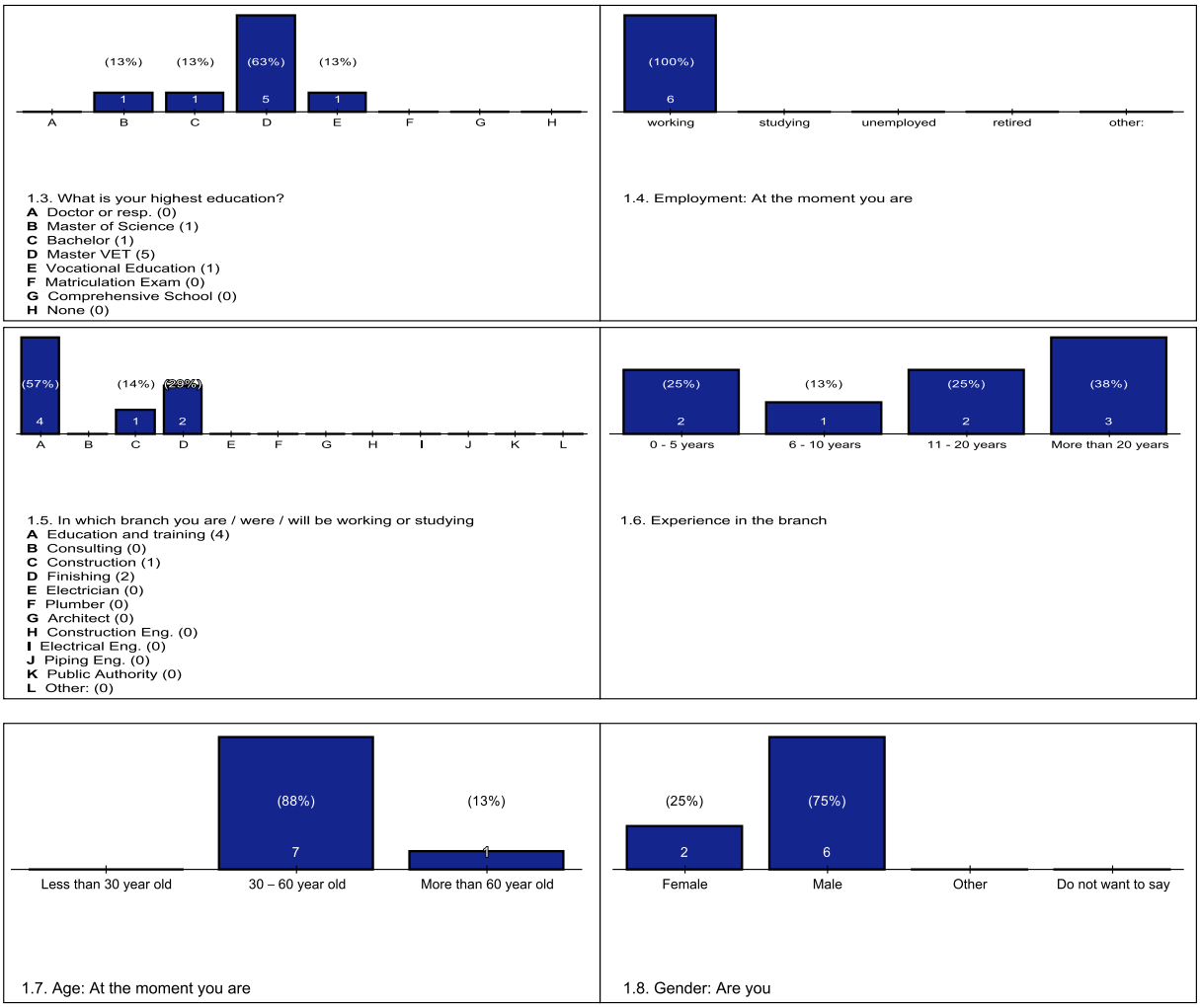
Overall, the feedback from lecturer provides valuable insights for improving curriculum delivery and student engagement in future courses. The lecturer agrees on the relevance and interest of course topics, the suitability of facilitations and noted students' active engagement.

Germany – Chamber of Crafts Schwerin (HWKS)

Course: CAD1 - Computer Aided Design

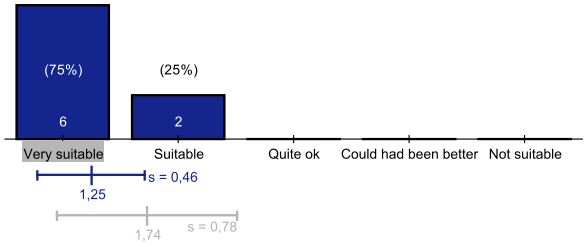
Participants – Students

Demography

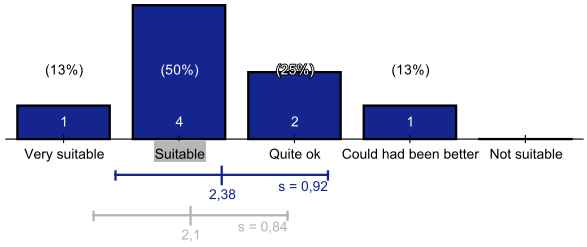


The evaluation survey was responded to by 8 students who participated the course. All students were elder than 30, 1 participant was more than 60 years old. In terms of gender representation, males dominated the sample with proportion of 75%, while females comprised the remaining portion, 25%. Regarding employment status, all students were being employed and working at a company. Overall, the feedback on facilitations reveals a generally positive perception among students, with a majority rating various aspects as “suitable”. Students positively assessed the place, the length, and the schedule of the training as well as the facilitations such as room and equipment.

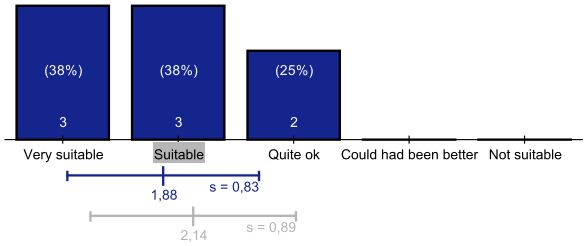
Educational Block



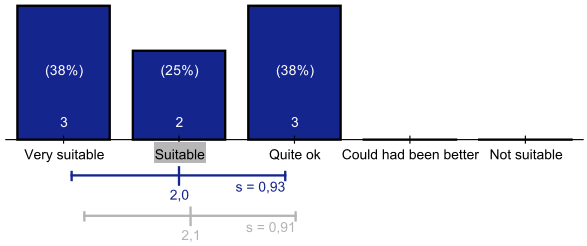
The Place for the course was



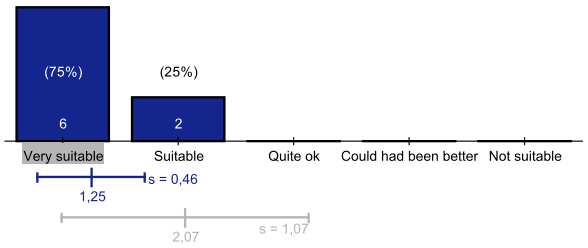
The time (Date) of the course was



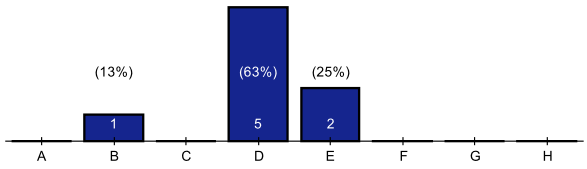
The length of the course was



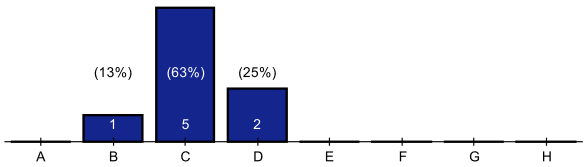
The schedule of the course was



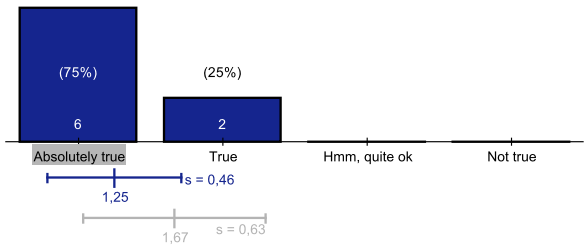
The facilitations (room, equipment etc) were



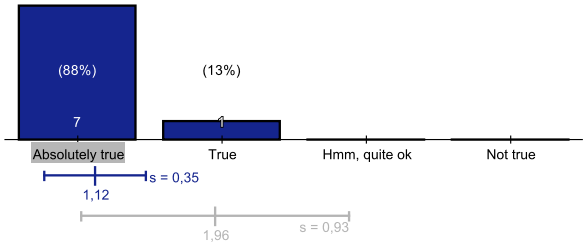
2.2. In common, the topics were (5 choices max):
A Topical (0)
B Interesting (1)
C Important (0)
D Close to my needs (5)
E Up to date (2)
F Boring (0)
G Out-of-date (0)
H Unnecessary (0)



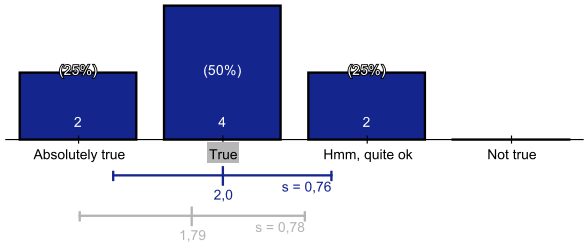
2.3. In common, the lecturers (5 choices max):
A Used interesting and motivating methods (0)
B Dealt with important topics (1)
C Were professionals in their branch (5)
D Met the expectations (2)
E Were up-to-date (0)
F Were boring (0)
G Were out-of-date (0)
H Wandered off the point (0)



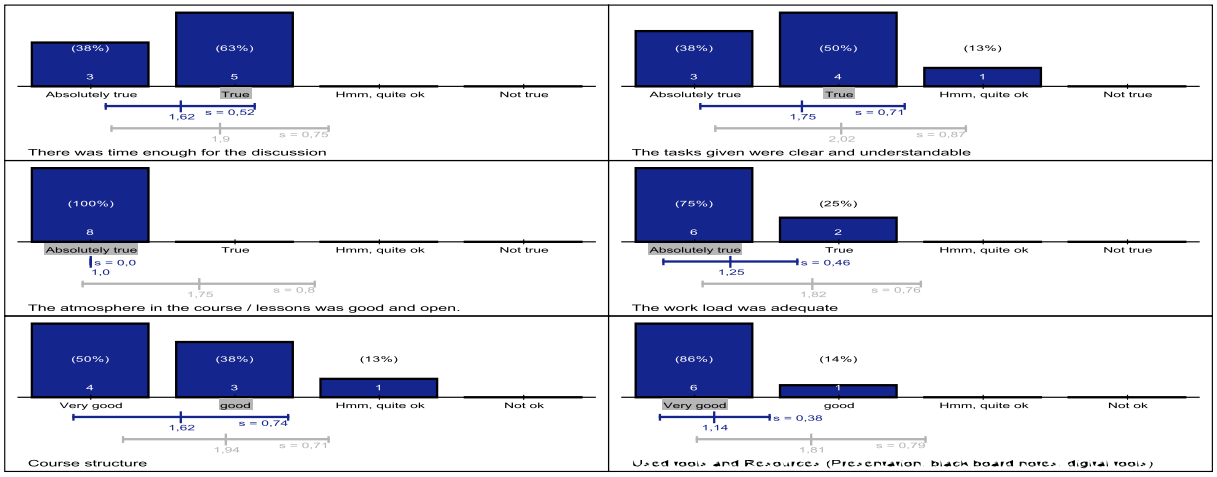
The information given was up-to-date

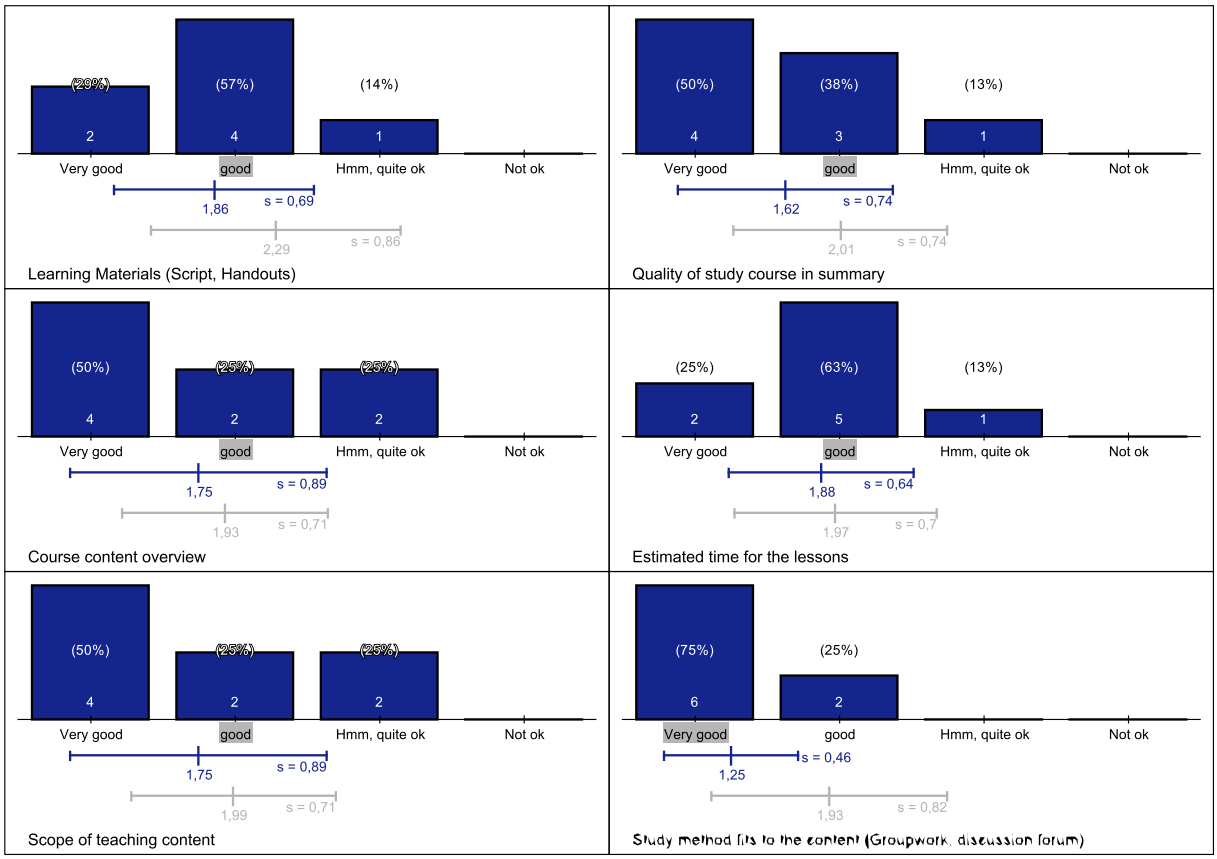


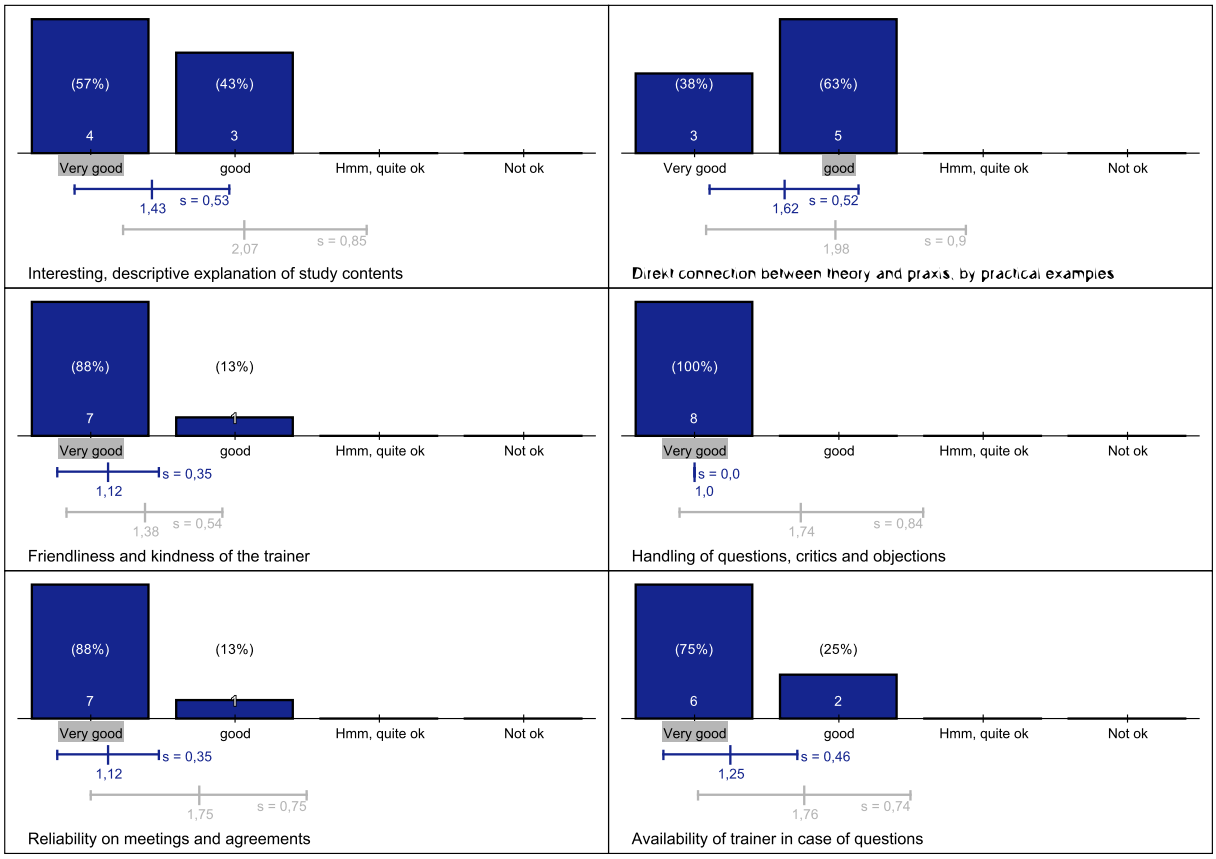
The presentation was clear and understandable



There was time enough for the topic


(38%) 3 Absolutely true
(63%) 5 True
Hmm, quite ok
Not true
1,62 s = 0,52
1,9 s = 0,75
There was time enough for the discussion
(38%) 3 Absolutely true
(50%) 4 True
(13%) 1 Hmm, quite ok
Not true
1,75 s = 0,71
2,02 s = 0,87
The tasks given were clear and understandable
(100%) 8 Absolutely true
True
Hmm, quite ok
Not true
s = 0,0
1,0
1,75 s = 0,8
The atmosphere in the course / lessons was good and open.
(75%) 6 Absolutely true
(25%) 2 True
Hmm, quite ok
Not true
s = 0,46
1,25
1,82 s = 0,76
The work load was adequate
(50%) 4 Very good
(38%) 3 good
(13%) 1 Hmm, quite ok
Not ok
1,62 s = 0,74
1,94 s = 0,71
Course structure
(86%) 6 Very good
(14%) 1 good
Hmm, quite ok
Not ok
s = 0,38
1,14
1,81 s = 0,79


(29%) 2 Very good
(57%) 4 good
(14%) 1 Hmm, quite ok
Not ok
1,86 s = 0,69
2,29 s = 0,86
Learning Materials (Script, Handouts)
(50%) 4 Very good
(38%) 3 good
(13%) 1 Hmm, quite ok
Not ok
1,62 s = 0,74
2,01 s = 0,74
Quality of study course in summary
(50%) 4 Very good
(25%) 2 good
(25%) 2 Hmm, quite ok
Not ok
1,75 s = 0,89
1,93 s = 0,71
Course content overview
(25%) 2 Very good
(63%) 5 good
(13%) 1 Hmm, quite ok
Not ok
1,88 s = 0,64
1,97 s = 0,7
Estimated time for the lessons
(50%) 4 Very good
(25%) 2 good
(25%) 2 Hmm, quite ok
Not ok
1,75 s = 0,89
1,99 s = 0,71
Scope of teaching content
(75%) 6 Very good
(25%) 2 good
Hmm, quite ok
Not ok
1,25 s = 0,46
1,93 s = 0,82
Study method fits to the content (Groupwork, discussion forum)



Free form answers

27 What would you like to say to teachers / facilitators. What could have done better, what should not be changed etc. Do you have any suggestions for improving the spatial and/or technical equipment?

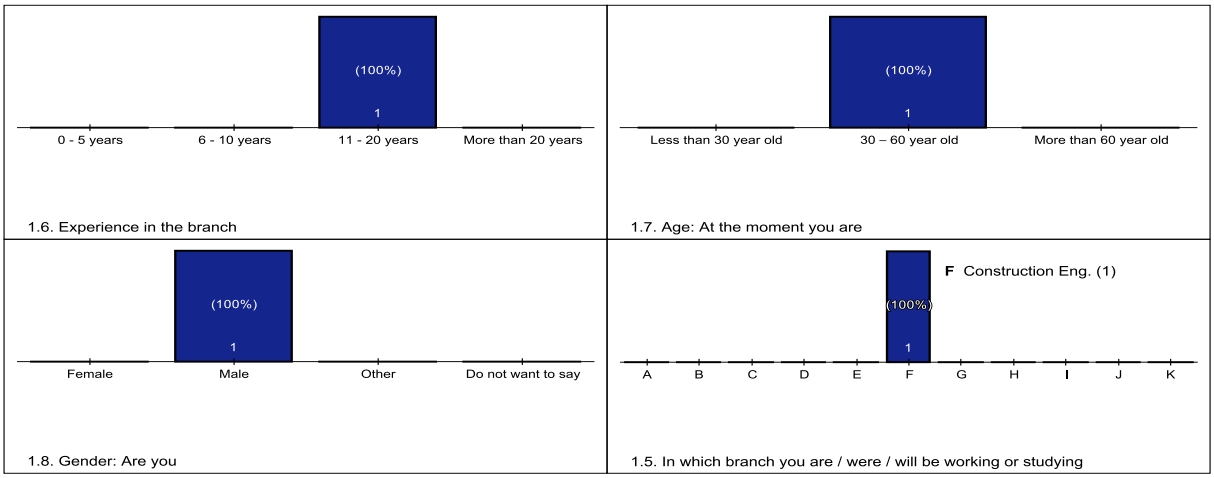
- Everything was fine
- First-class course with a very professional instructor. The topic was implemented excellently. Top!
- Ok.

Conclusion

In summary, students generally expressed a high level of satisfaction with the course, positively evaluated their own learning experience. Participants have learned working with Computer Aided Design.

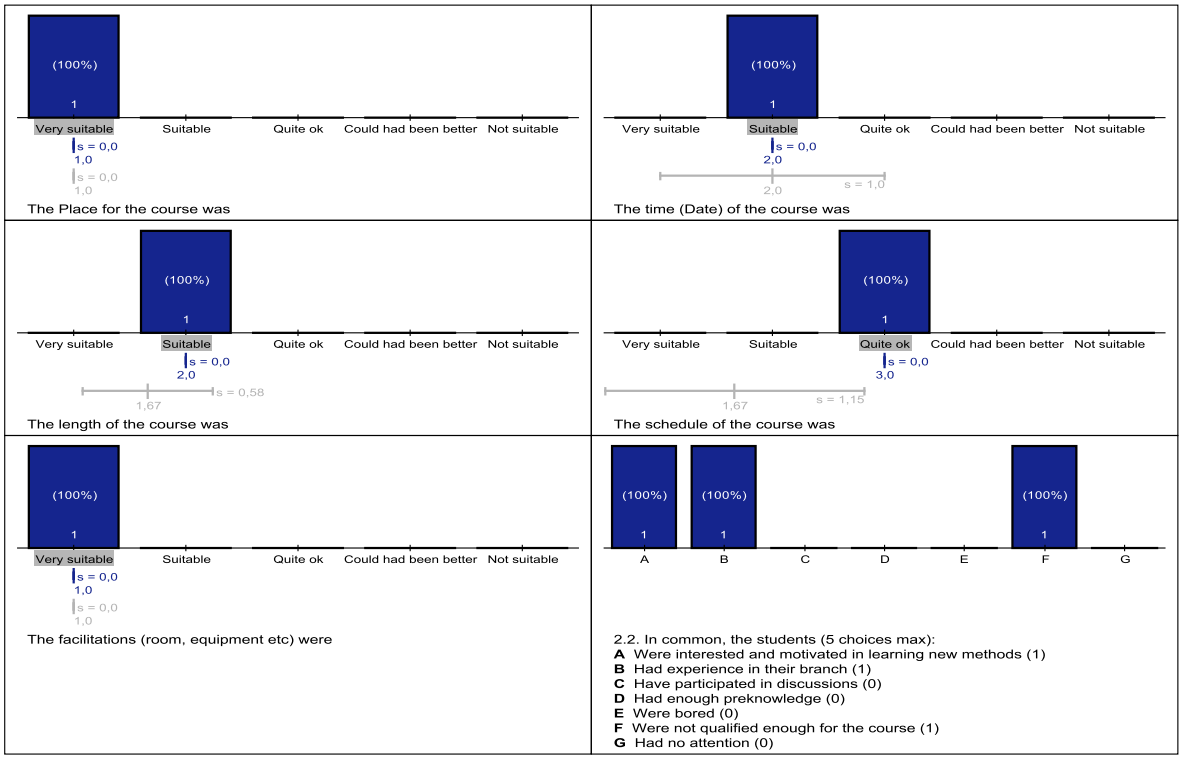
Lecturer

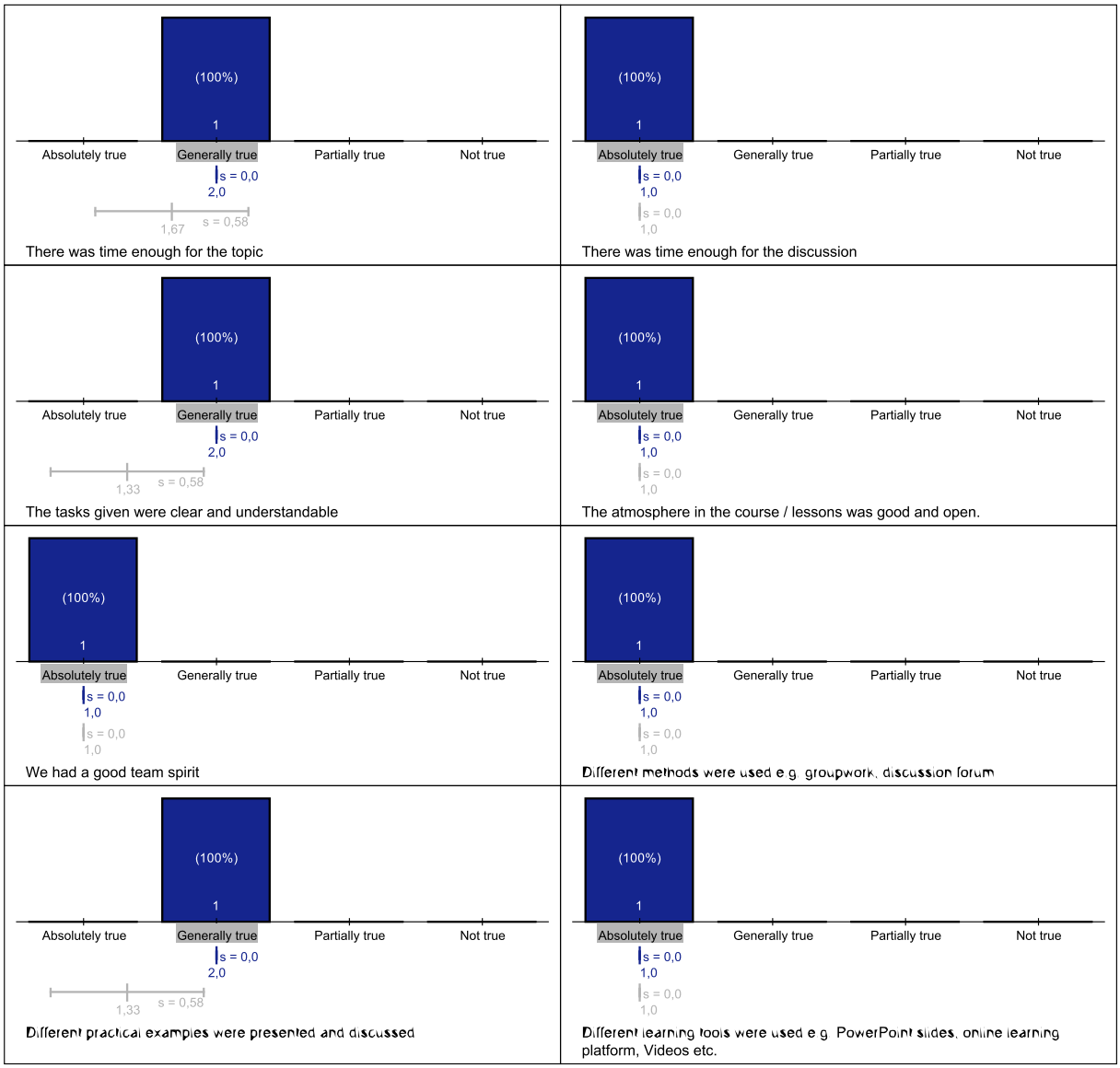
Demography



The evaluation survey received responses from the lecturer who taught the course. The lecturer falls within the age range of 30 to 60 years old. Regarding profession, the lecturer identified himself as being active in construction engineering having betwwen 11 and 20 years experience in the branch.

Educational Block





Free form answers

What could have been better, what should not be changed etc. Do you have any suggestions or lessons learned for improving the spatial and/or technical equipment?

•Participants should be selected more based on their role and company

Conclusion

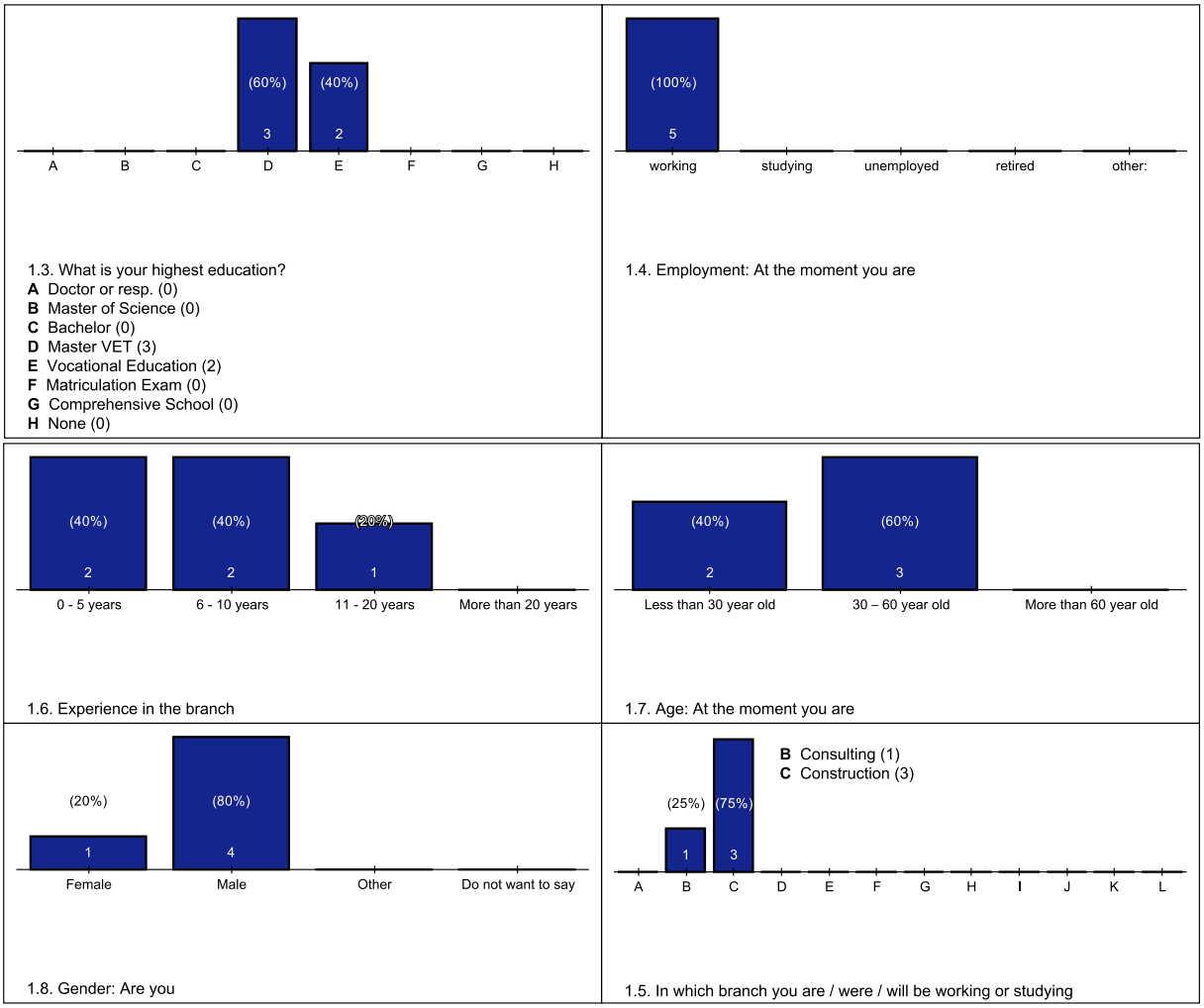
The lecturer agrees on the relevance and interest of course topics and the suitability of facilitations. Overall, the feedback from lecturer provides some insights on how to improve curriculum and student engagement in future courses.

Course: DCT - Digital Construction Technologies

Part 3D Printing and scanning

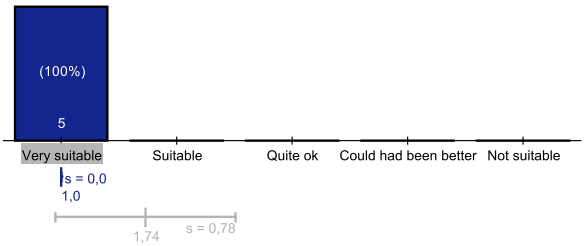
Participants – Students

Demography

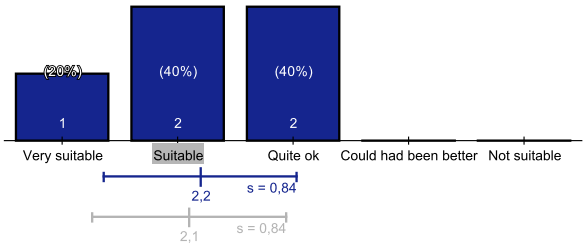


The evaluation survey was responded to by 5 students who participated the module. 40% of the students were younger than 30, 60% were between 30 and 60 years old. In terms of gender representation, males dominated the sample with proportion of 80%, while females comprised the remaining portion, 20%. Regarding employment status, all students were working at a company in the construction or consulting sector. Overall, the feedback on facilitations reveals a generally positive perception among students, with a majority rating various aspects as “suitable” as average. Students positively assessed the place, the length, and the schedule of the course as well as the facilitations such as room and equipment.

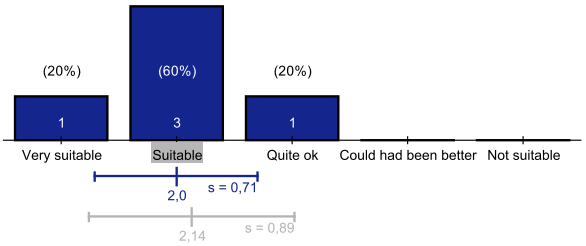
Educational Block



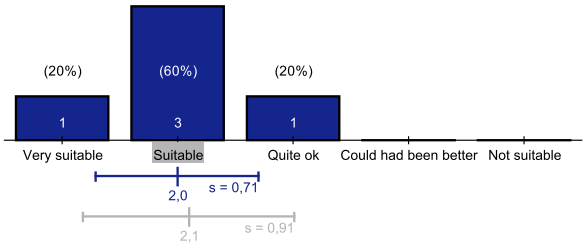
The Place for the course was



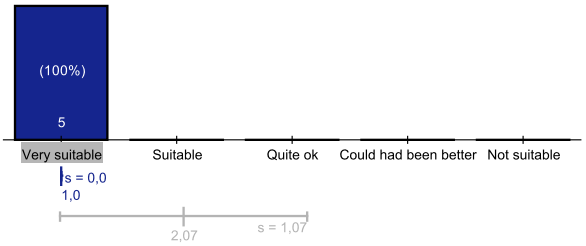
The time (Date) of the course was



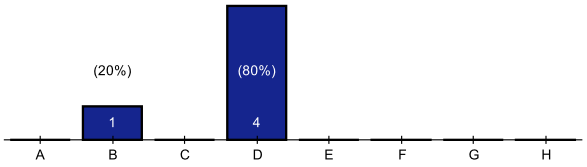
The length of the course was



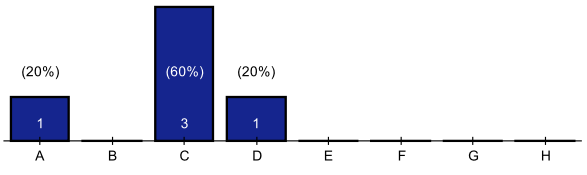
The schedule of the course was



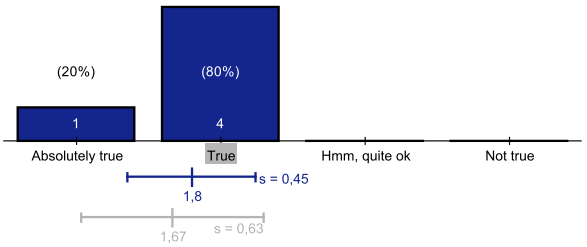
The facilitations (room, equipment etc) were



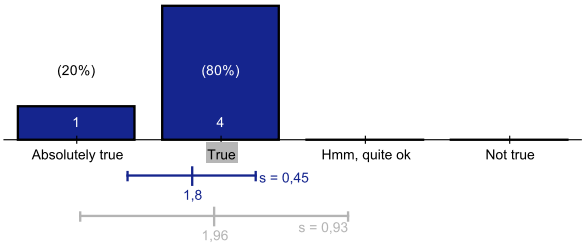
2.2. In common, the topics were (5 choices max):
A Topical (0)
B Interesting (1)
C Important (0)
D Close to my needs (4)
E Up to date (0)
F Boring (0)
G Out-of-date (0)
H Unnecessary (0)



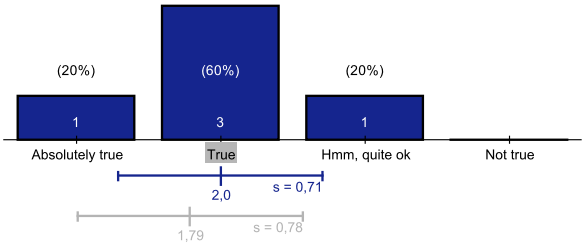
2.3. In common, the lecturers (5 choices max):
A Used interesting and motivating methods (1)
B Dealt with important topics (0)
C Were professionals in their branch (3)
D Met the expectations (1)
E Were up-to-date (0)
F Were boring (0)
G Were out-of-date (0)
H Wandered off the point (0)



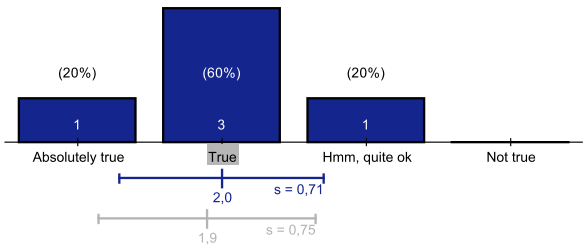
The information given was up-to-date



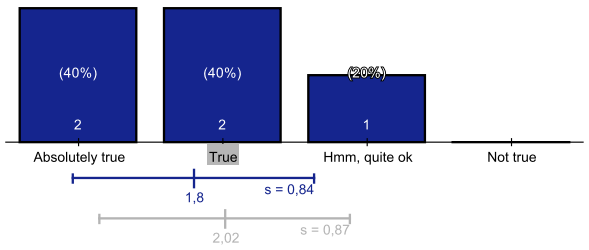
The presentation was clear and understandable



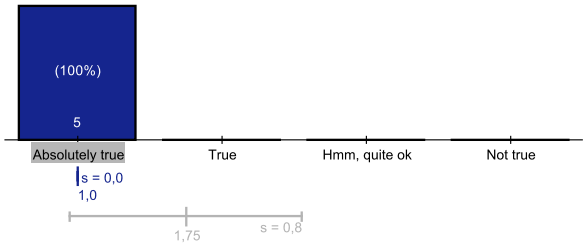
There was time enough for the topic



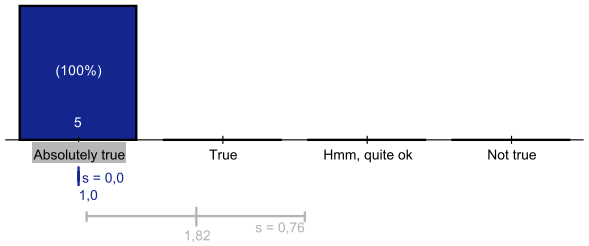
There was time enough for the discussion



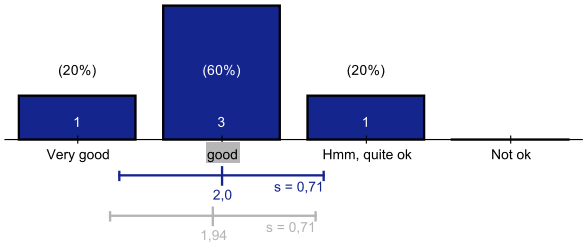
The tasks given were clear and understandable



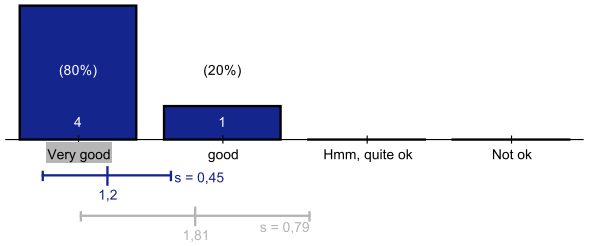
The atmosphere in the course / lessons was good and open.



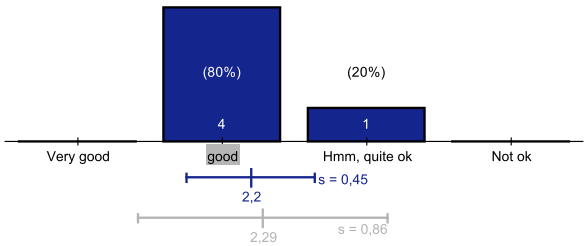
The work load was adequate



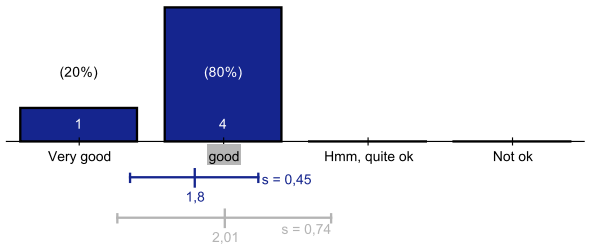
Course structure



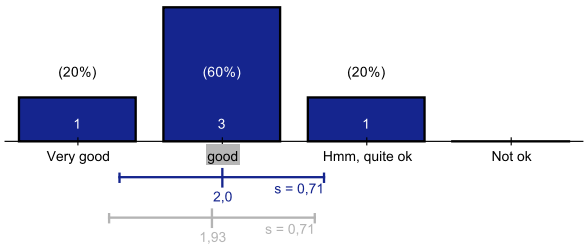
Used tools and Resources (Presentation, black board notes, digital tools)



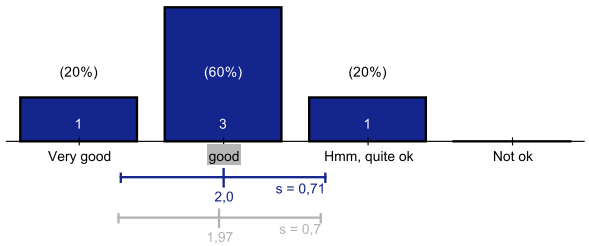
Learning Materials (Script, Handouts)



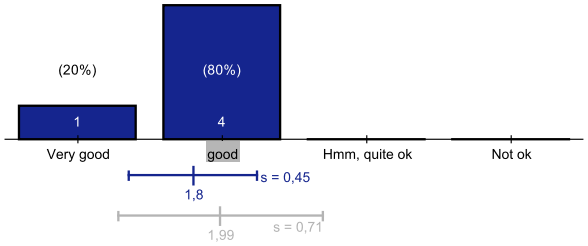
Quality of study course in summary



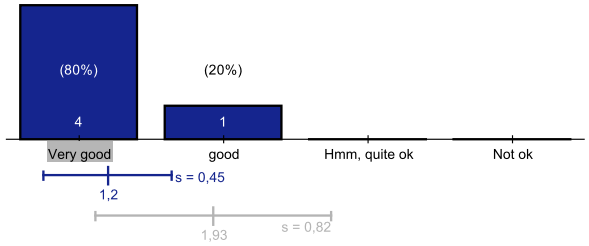
Course content overview



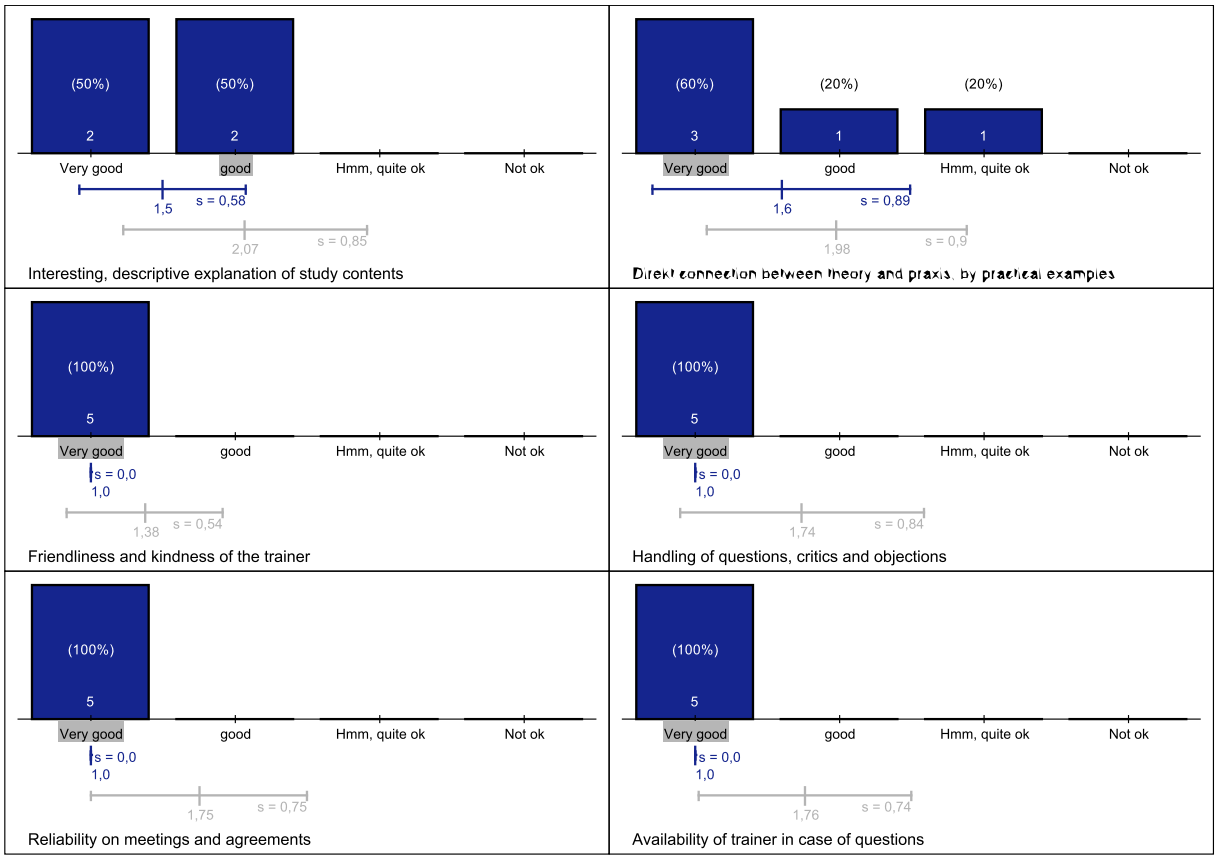
Estimated time for the lessons



Scope of teaching content



Study method fits to the content (Groupwork, discussion forum)



Free form answers

27 What would you like to say to teachers / facilitators. What could have done better, what should not be changed etc. Do you have any suggestions for improving the spatial and/or technical equipment?

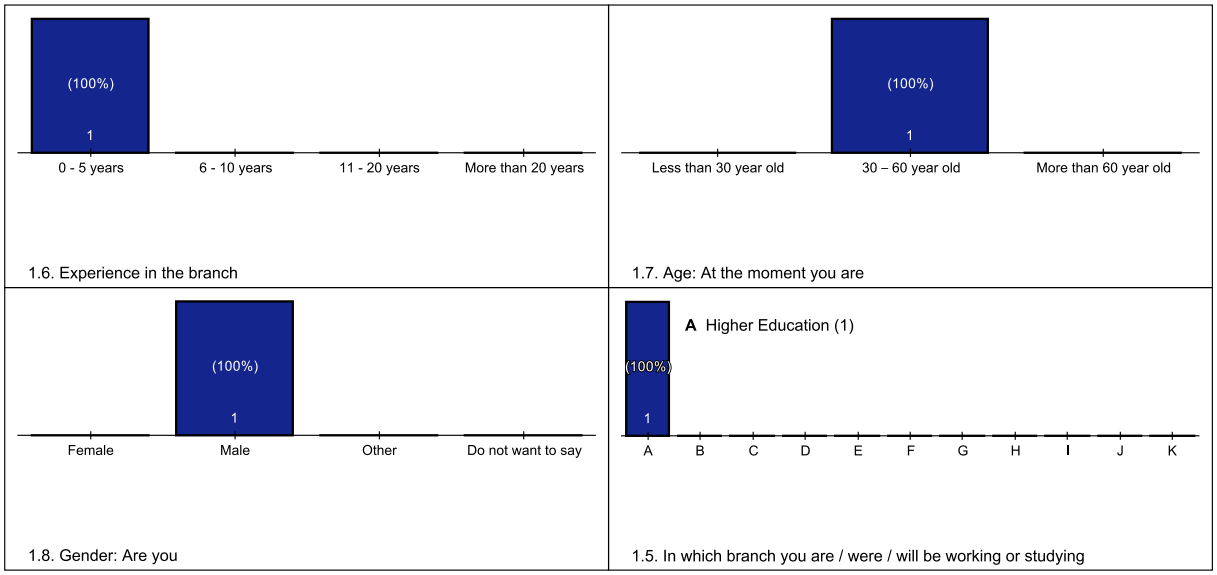
- Homogenous group would be better, but, it was ok.

Conclusion

In summary, students generally expressed a high level of satisfaction with the course, positively evaluated their own learning experience. Participants have learned working with Digital Construction Technologies such 3D Printing and 3D Scanning.

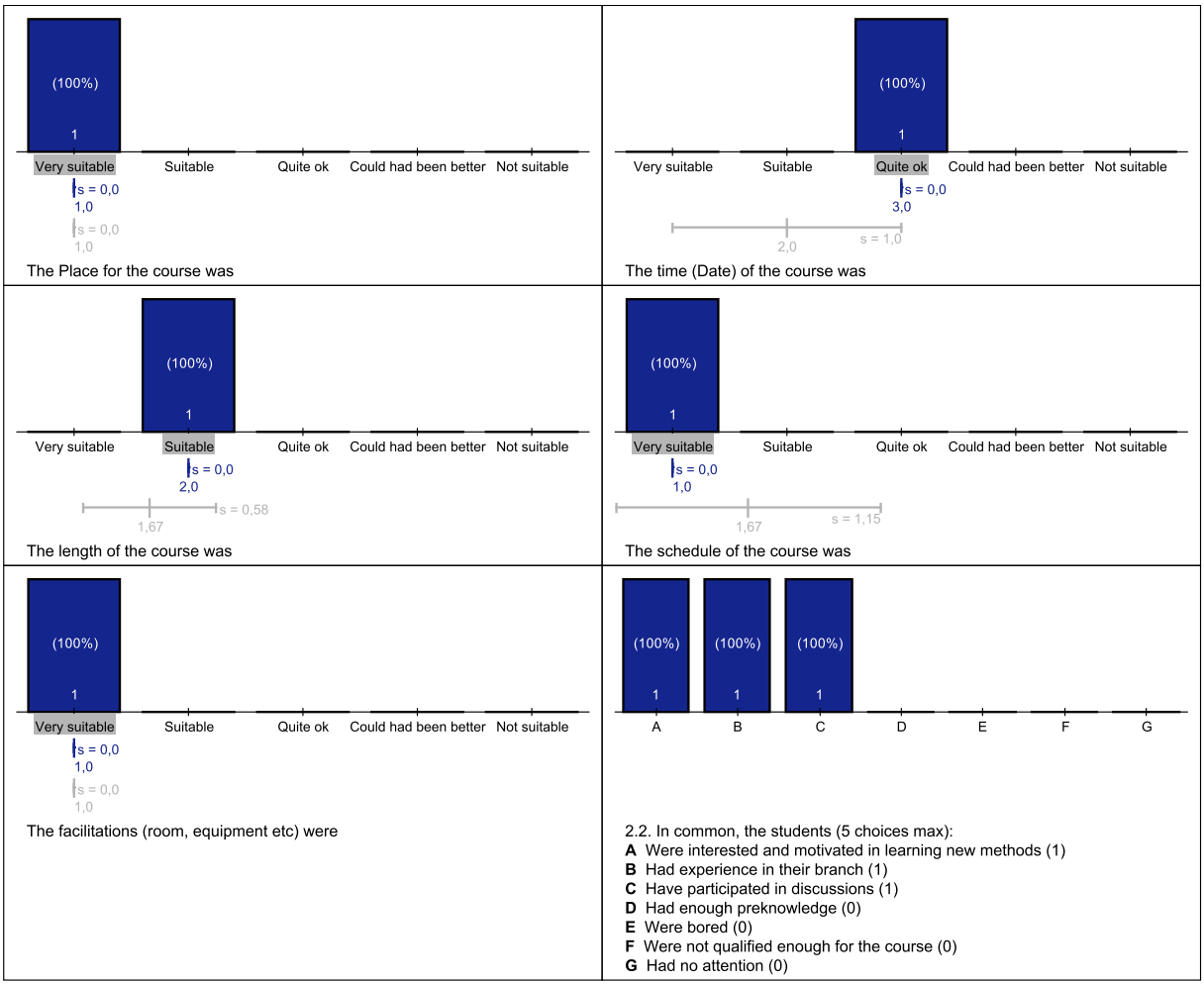
Lecturer

Demography



The evaluation survey received responses from the lecturer who taught the course. The lecturer falls within the age range of 30 to 60 years old. Regarding profession, the lecturer identified himself as being active in higher education having some years experience.

Educational Block



Conclusion

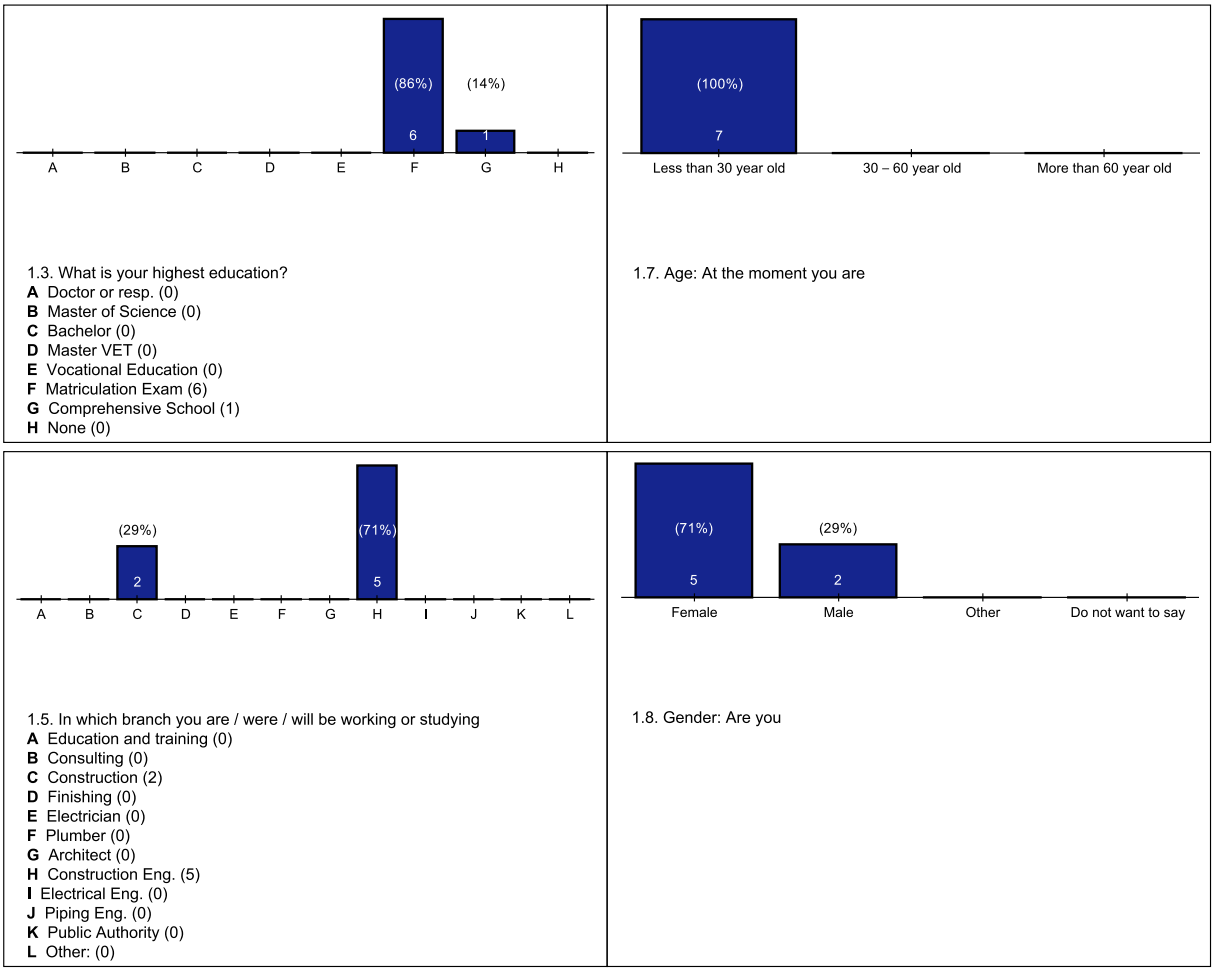
The lecturer agrees on the relevance and interest of course topics and rated lecture as very good and useful. The students were interested in and motivated to learn new methods, had experience in their field and have participated in discussions. The tasks given were clear and understandable, the atmosphere on the course was good and open. Different methods were used e.g. groupwork, discussion forum and different practical examples were presented and discussed. Also, different learning tools were used e.g. PowerPoint slides, online learning platform, Videos etc.

Germany – University of Applied Sciences Buxtehude (HS21)

Course: DFM – Digital Finance Management

Participants – Students

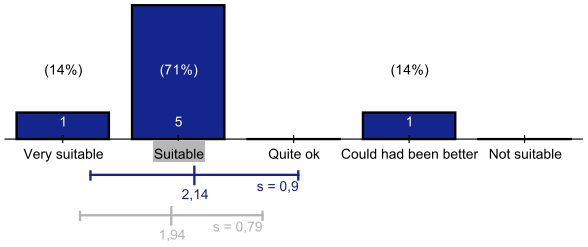
Demography



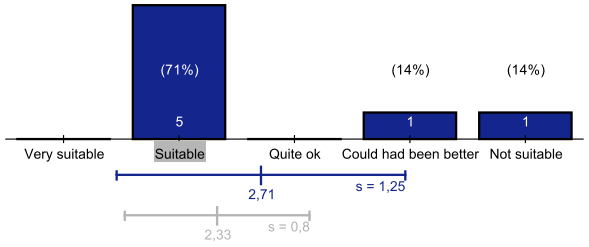
The evaluation survey was conducted by 7 students who participated in the course. All students were younger than 30. In terms of gender representation, females dominated the sample with proportion of 71%, while males comprised the remaining portion, 29%. All students were full time students matriculated at the university.

Educational Block

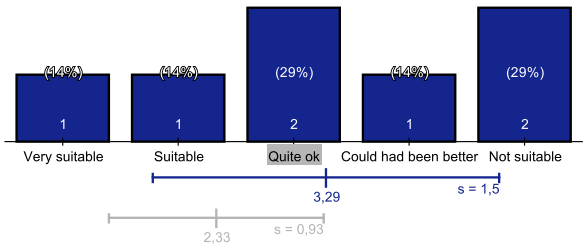
Overall, the feedback on facilitations reveals a generally positive perception among students. Students positively assessed the place, the length, and the schedule of the training as well as the facilitations such as room and equipment and rated them as suitable. In common, the lecturer used interesting and motivating methods and dealt with important topics. The information given was up-to-date and the presentation was clear and understandable. There was time enough for the topic and for discussions.



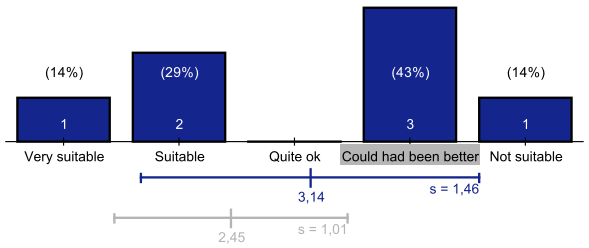
The Place for the course was



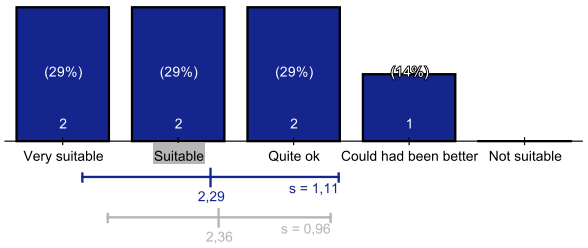
The time (Date) of the course was



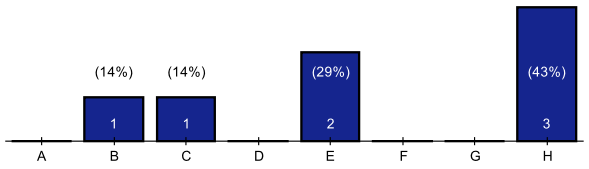
The length of the course was



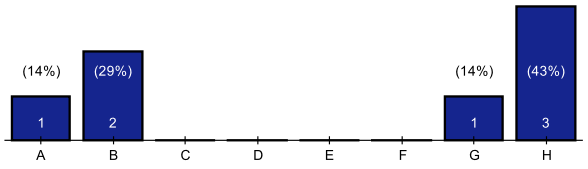
The schedule of the course was



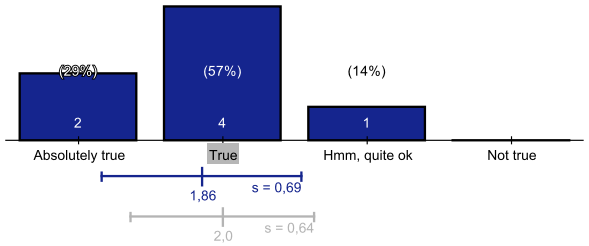
The facilitations (room, equipment etc) were



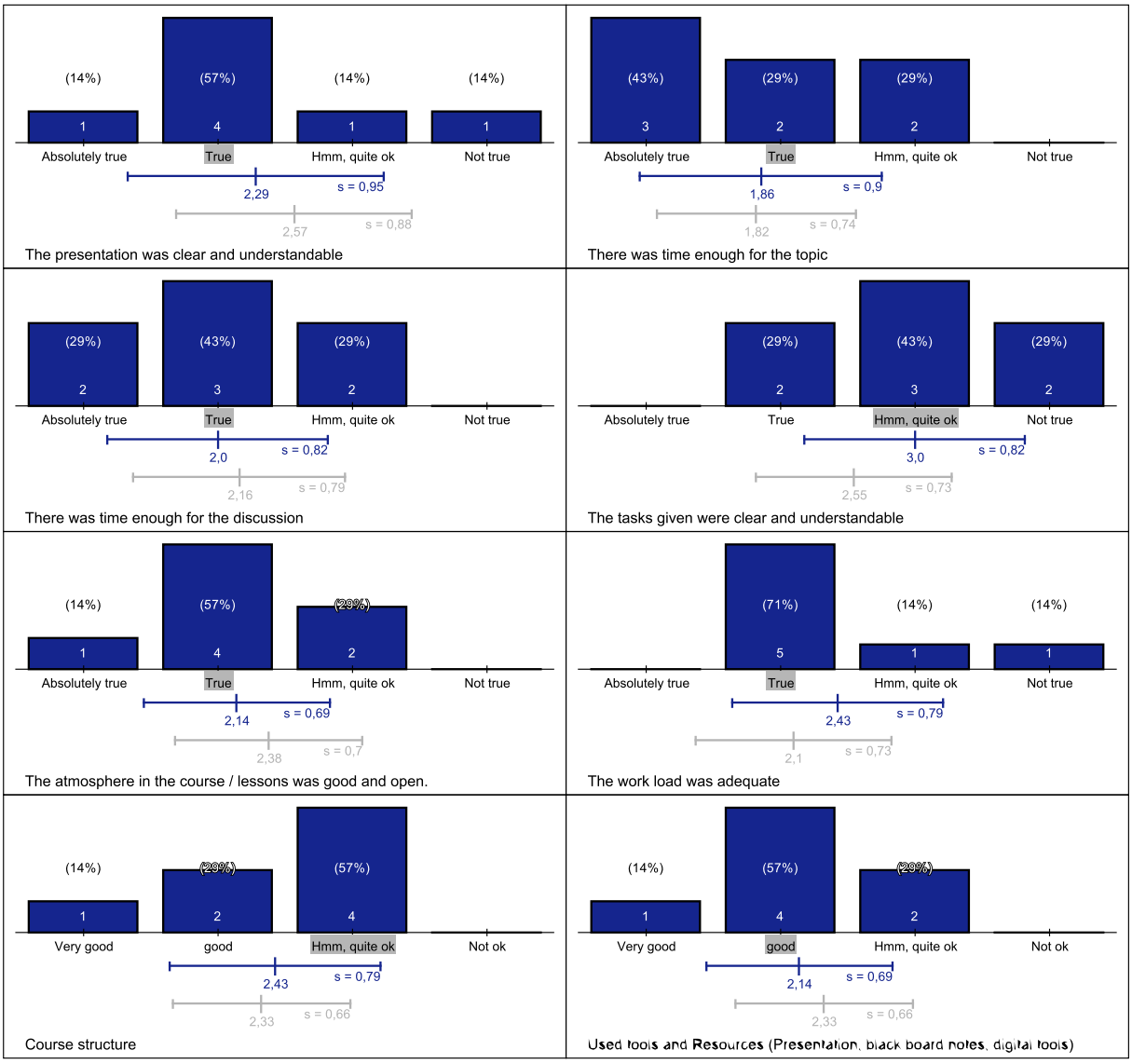
2.2. In common, the topics were (5 choices max):
A Topical (0)
B Interesting (1)
C Important (1)
D Close to my needs (0)
E Up to date (2)
F Boring (0)
G Out-of-date (0)
H Unnecessary (3)

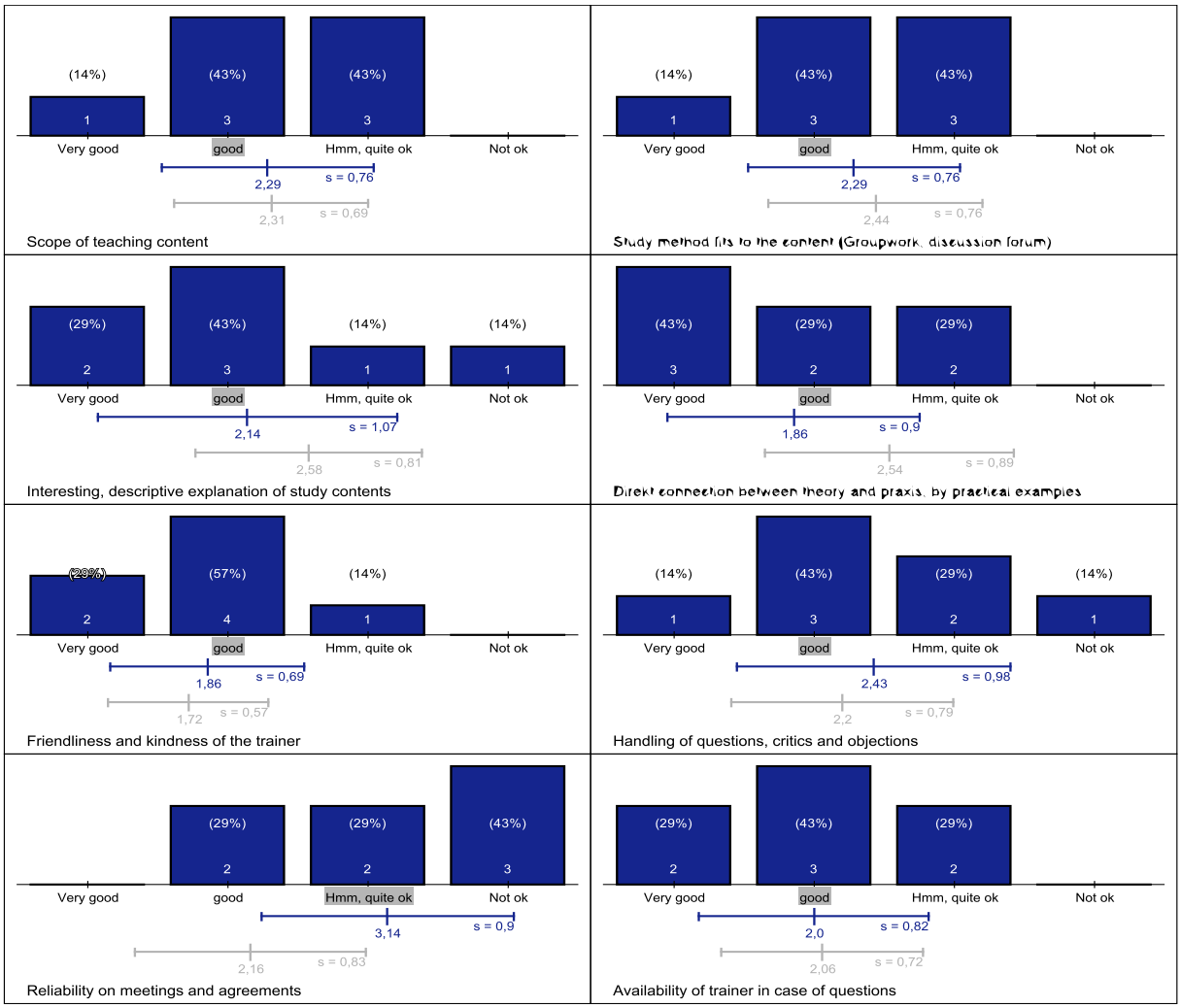


2.3. In common, the lecturers (5 choices max):
A Used interesting and motivating methods (1)
B Dealt with important topics (2)
C Were professionals in their branch (0)
D Met the expectations (0)
E Were up-to-date (0)
F Were boring (0)
G Were out-of-date (1)
H Wandered off the point (3)



The information given was up-to-date


(14%) (57%) (14%) (14%)
1 4 1 1
Absolutely true True Hmm, quite ok Not true
2,29 s = 0,95
2,57 s = 0,88
The presentation was clear and understandable
(43%) (29%) (29%)
3 2 2
Absolutely true True Hmm, quite ok Not true
1,86 s = 0,9
1,82 s = 0,74
There was time enough for the topic
(29%) (43%) (29%)
2 3 2
Absolutely true True Hmm, quite ok Not true
2,0 s = 0,82
2,16 s = 0,79
There was time enough for the discussion
(29%) (43%) (29%)
2 3 2
Absolutely true True Hmm, quite ok Not true
3,0 s = 0,82
2,55 s = 0,73
The tasks given were clear and understandable
(14%) (57%) (29%)
1 4 2
Absolutely true True Hmm, quite ok Not true
2,14 s = 0,69
2,38 s = 0,7
The atmosphere in the course / lessons was good and open.
(71%) (14%) (14%)
5 1 1
Absolutely true True Hmm, quite ok Not true
2,43 s = 0,79
2,1 s = 0,73
The work load was adequate
(14%) (29%) (57%)
1 2 4
Very good good Hmm, quite ok Not ok
2,43 s = 0,79
2,33 s = 0,66
Course structure
(14%) (57%) (29%)
1 4 2
Very good good Hmm, quite ok Not ok
2,14 s = 0,69
2,33 s = 0,66
Used tools and Resources (Presentation, black board notes, digital tools)
(14%) (57%) (14%) (14%)
1 4 1 1
Very good good Hmm, quite ok Not ok
2,29 s = 0,95
2,7 s = 0,79
Learning Materials (Script, Handouts)
(57%) (14%) (29%)
4 1 2
Very good good Hmm, quite ok Not ok
2,71 s = 0,95
2,5 s = 0,71
Quality of study course in summary
(57%) (43%)
4 3
Very good good Hmm, quite ok Not ok
2,43 s = 0,53
2,3 s = 0,61
Course content overview
(14%) (43%) (29%) (14%)
1 3 2 1
Very good good Hmm, quite ok Not ok
2,43 s = 0,98
2,22 s = 0,65
Estimated time for the lessons



Free form answers

2.7. What would you like to say to teachers / facilitators. What could have been better, what should not be changed etc. Do you have any suggestions for improving the spatial and/or technical equipment?

Exam times regarding BWLA should be adjusted, as the allotted time is insufficient. Due to the structure of the exam, it is not possible to properly present the required content in written form within the given timeframe.

Conclusion

In summary, students generally expressed a high level of satisfaction with the course, positively evaluating their own learning experience. The few negative reviews can be attributed to the fact that the level of education and workload at the university are relatively high and demanding. The students were challenged to learn the material thoroughly before the exam.

Lecturer

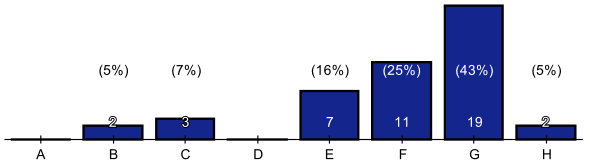
Since the professors are employed by the university and teach regularly, no separate written evaluation was requested. Instead, they were asked to provide a brief assessment of their course from their perspective.

The lecturer agreed on the relevance and interest of his course topics and the suitability of facilitations. He rated the course as successful and treated a wide range of topics. He agreed that the workload was relatively high and demanding, however the topics are important for the working practice.

Course: EXA - Introduction Excel & Access

Participants – Students

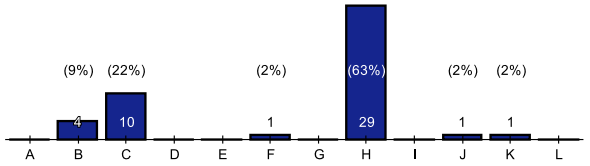
Demography



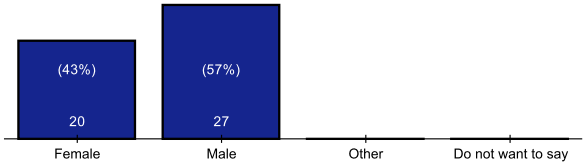
1.3. What is your highest education?
A Doctor or resp. (0)
B Master of Science (2)
C Bachelor (3)
D Master VET (0)
E Vocational Education (7)
F Matriculation Exam (11)
G Comprehensive School (19)
H None (2)

1.4. Employment: At the moment you are

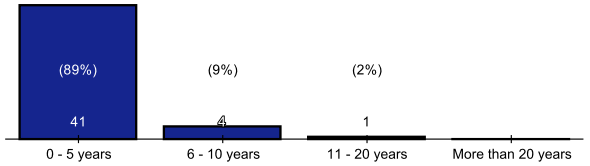
- dual study
- studying dual
- working and studying



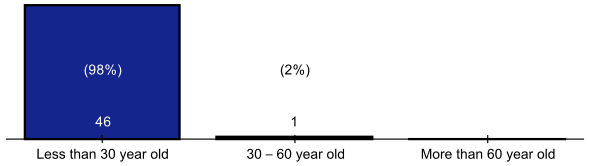
1.5. In which branch you are / were / will be working or studying
A Education and training (0)
B Consulting (4)
C Construction (10)
D Finishing (0)
E Electrician (0)
F Plumber (1)
G Architect (0)
H Construction Eng. (29)
I Electrical Eng. (0)
J Piping Eng. (1)
K Public Authority (1)
L Other: (0)



1.8. Gender: Are you



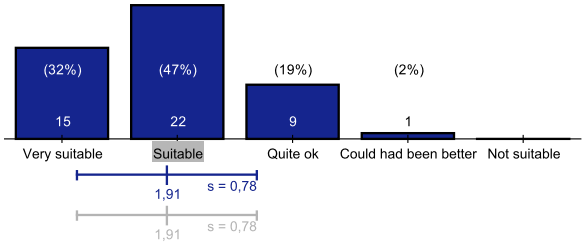
1.6. Experience in the branch



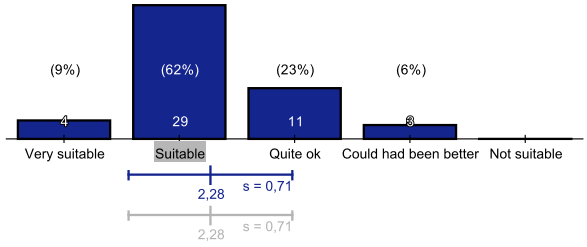
1.7. Age: At the moment you are

The evaluation survey was delivered by 47 students who participated the course. Almost every student was younger than 30, 1 participant was between 30 and 60 years old. In terms of gender representation, males dominated the sample with proportion of 57%, while females comprised the remaining portion, 43%. Regarding employment status, all students were being employed and working at a company, while studying on the university as full-time students in dual education. Overall, the feedback on facilitations reveals a generally positive perception among students, with a majority rating various aspects as “suitable”. Students positively assessed the place, the length, and the schedule of the training as well as the facilitations such as room and equipment.

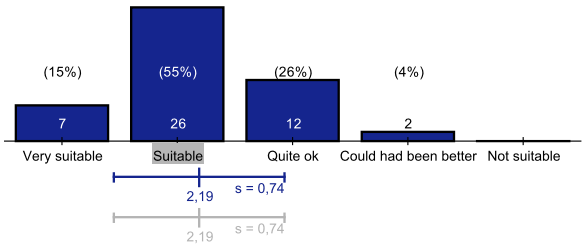
Educational Block



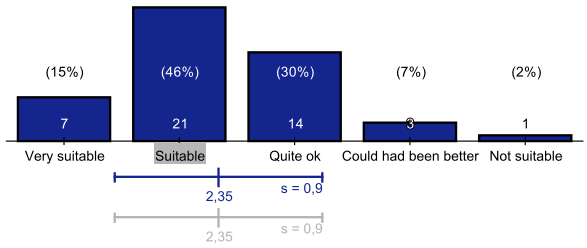
The Place for the course was



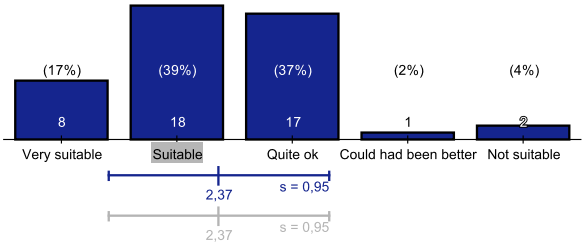
The time (Date) of the course was



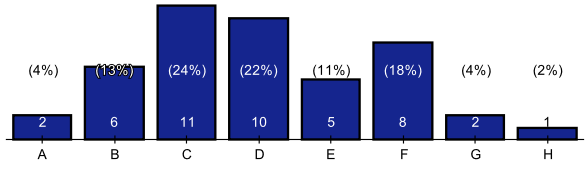
The length of the course was



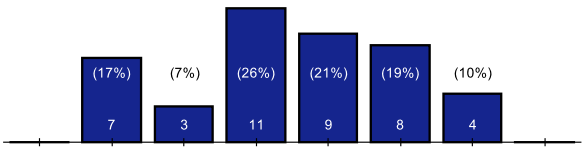
The schedule of the course was



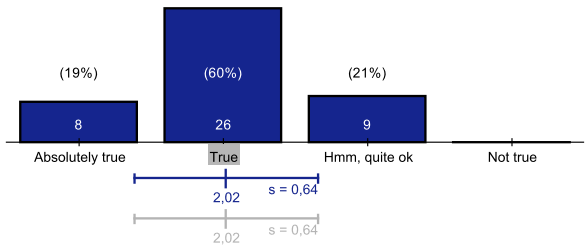
The facilitations (room, equipment etc) were



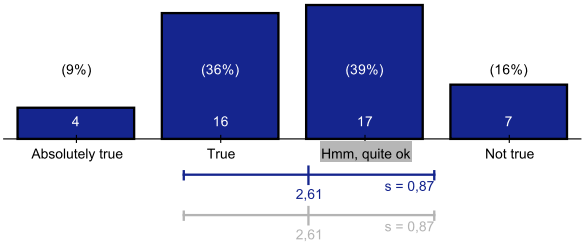
2.2. In common, the topics were (5 choices max):
A Topical (2)
B Interesting (6)
C Important (11)
D Close to my needs (10)
E Up to date (5)
F Boring (8)
G Out-of-date (2)
H Unnecessary (1)



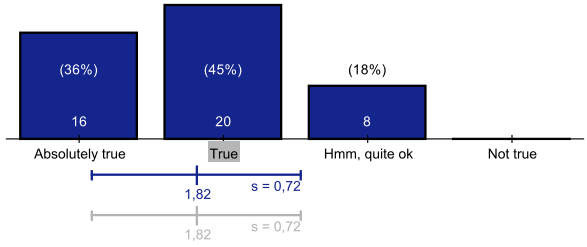
2.3. In common, the lecturers (5 choices max):
A Used interesting and motivating methods (0)
B Dealt with important topics (7)
C Were professionals in their branch (3)
D Met the expectations (11)
E Were up-to-date (9)
F Were boring (8)
G Were out-of-date (4)
H Wandered off the point (0)



The information given was up-to-date

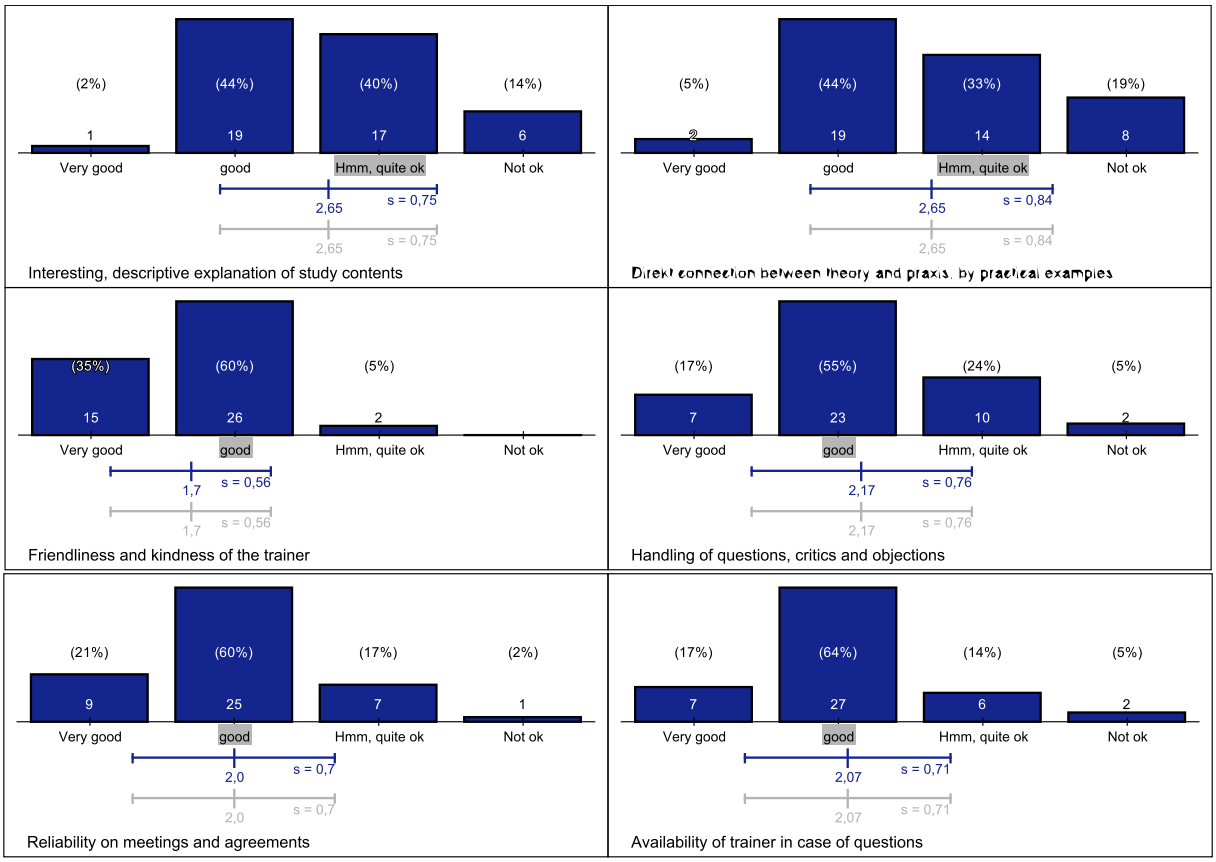


The presentation was clear and understandable



There was time enough for the topic


(16%) (56%) (21%) (7%)
7 24 9 8
Absolutely true True Hmm, quite ok Not true
2,19 s = 0,79
2,19 s = 0,79
There was time enough for the discussion
(7%) (43%) (45%) (5%)
3 19 20 2
Absolutely true True Hmm, quite ok Not true
2,48 s = 0,7
2,48 s = 0,7
The tasks given were clear and understandable
(9%) (42%) (47%) (2%)
4 18 20 1
Absolutely true True Hmm, quite ok Not true
2,42 s = 0,7
2,42 s = 0,7
The atmosphere in the course / lessons was good and open.
(18%) (64%) (14%) (5%)
8 28 6 2
Absolutely true True Hmm, quite ok Not true
2,05 s = 0,71
2,05 s = 0,71
The work load was adequate
(5%) (64%) (26%) (5%)
2 27 11 2
Very good good Hmm, quite ok Not ok
2,31 s = 0,64
2,31 s = 0,64
Course structure
(5%) (60%) (31%) (5%)
2 25 13 2
Very good good Hmm, quite ok Not ok
2,36 s = 0,66
2,36 s = 0,66
Used tools and Resources (Presentation, black board notes, digital tools)
(5%) (29%) (53%) (14%)
2 12 23 6
Very good good Hmm, quite ok Not ok
2,77 s = 0,75
2,77 s = 0,75
Learning Materials (Script, Handouts)
(2%) (56%) (34%) (7%)
1 23 14 3
Very good good Hmm, quite ok Not ok
2,46 s = 0,67
2,46 s = 0,67
Quality of study course in summary
(7%) (60%) (30%) (2%)
3 26 13 1
Very good good Hmm, quite ok Not ok
2,28 s = 0,63
2,28 s = 0,63
Course content overview
(7%) (70%) (21%) (2%)
3 30 9 1
Very good good Hmm, quite ok Not ok
2,19 s = 0,59
2,19 s = 0,59
Estimated time for the lessons
(10%) (51%) (37%) (2%)
4 21 15 1
Very good good Hmm, quite ok Not ok
2,32 s = 0,69
2,32 s = 0,69
Scope of teaching content
(9%) (42%) (42%) (7%)
4 18 18 3
Very good good Hmm, quite ok Not ok
2,47 s = 0,77
2,47 s = 0,77
Study method fits to the content (Groupwork, discussion forum)



Free form answers

2.7. What would you like to say to teachers / facilitators. What could have been better, what should not be changed etc. Do you have any suggestions for improving the spatial and/or technical equipment?

- *Please make sure to explain the topics properly. Ensure that the questions and tasks are clearly structured and unambiguous.*
- *Most of the tasks were self-explanatory even if you did not have much experience*
- *Provide some tutorial videos, in case you want to repeat the topics dealt with in the class*

Conclusion

In summary, students generally expressed their satisfaction with the course, positively evaluated their own learning experience. In common the lecturer dealt with important topics, was professional in her branch, met the expectations, and was up to date.

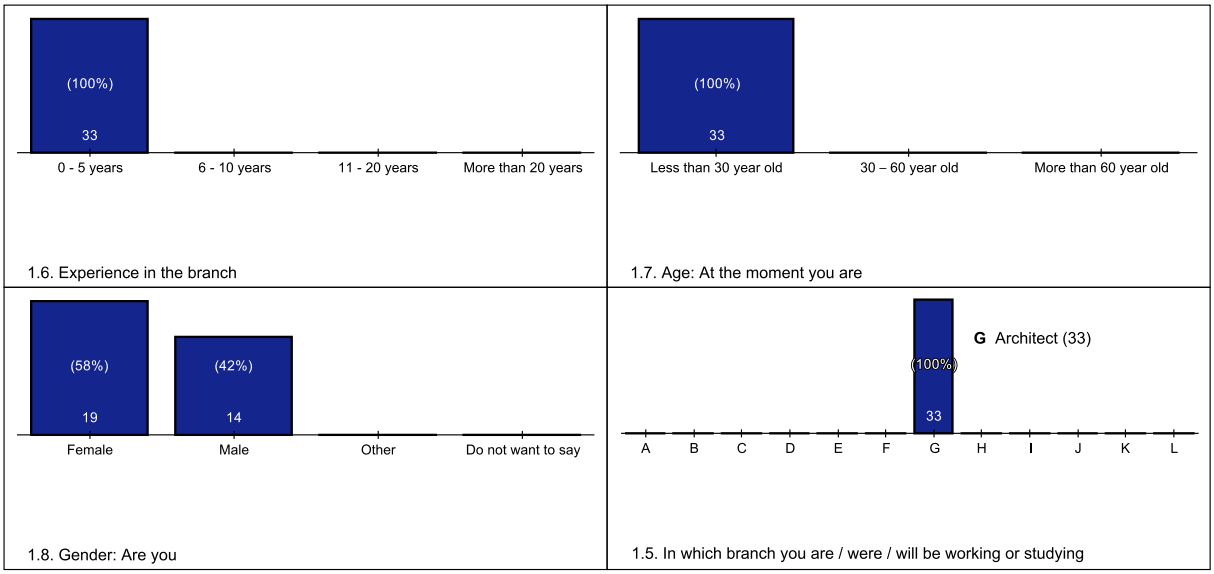
Lecturer

Since the professors are employed by the university and teach regularly, no separate written evaluation was requested. Instead, they were asked to provide a brief assessment of their course from their perspective. The lecturer agrees on the relevance and interest of course topics and the suitability of facilitations. Overall, the feedback from lecturer provides some insights on how to improve curriculum and student engagement in future courses. The students have learned working with Excel and programming in Visual

Basics. The large group size of around 50 Students made it difficult to deal with individual needs and during the lectures. Organising the course in the future in small groups may gain a more efficient learning effect and satisfaction both for lecturer and students.

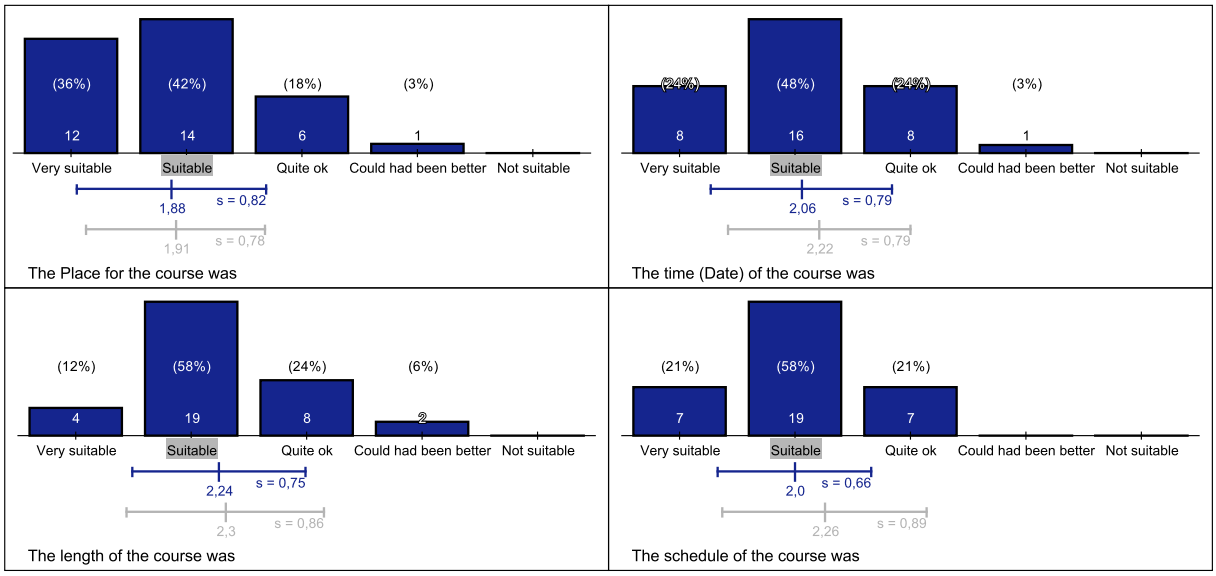
Course: CAD2 – Computer Aided Design and Presentation
Participants – Students

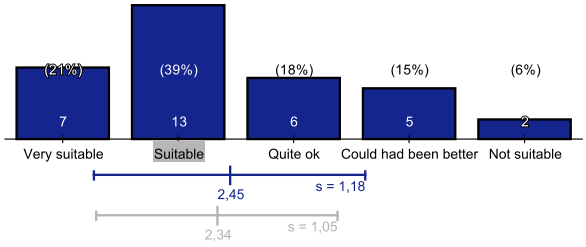
Demography



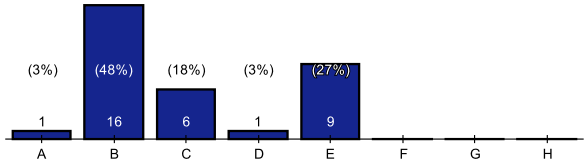
The evaluation survey was responded by 33 students who participated the course. All students were younger than 30 years old. In terms of gender representation, females dominated the sample with proportion of 58%, while males comprised the remaining portion, 42%. Regarding employment status, all students were being employed and working at a company., as full-time dual students in architecture. Overall, the feedback on facilitations reveals a generally positive perception among students, with a majority rating various aspects as “suitable”. Students positively assessed the place, the length, and the schedule of the training as well as the facilitations such as room and equipment.

Educational Block

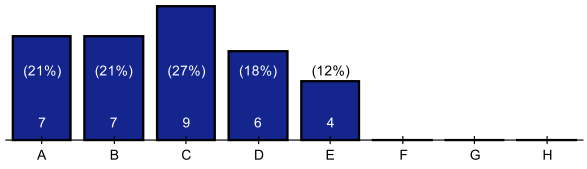

(36%)
12
(42%)
14
(18%)
6
(3%)
1
Very suitable
Suitable
Quite ok
Could had been better
Not suitable
1,88
s = 0,82
1,91
s = 0,78
The Place for the course was
(24%)
8
(48%)
16
(24%)
8
(3%)
1
Very suitable
Suitable
Quite ok
Could had been better
Not suitable
2,06
s = 0,79
2,22
s = 0,79
The time (Date) of the course was
(12%)
4
(58%)
19
(24%)
8
(6%)
2
Very suitable
Suitable
Quite ok
Could had been better
Not suitable
2,24
s = 0,75
2,3
s = 0,86
The length of the course was
(21%)
7
(58%)
19
(21%)
7
Very suitable
Suitable
Quite ok
Could had been better
Not suitable
2,0
s = 0,66
2,26
s = 0,89
The schedule of the course was



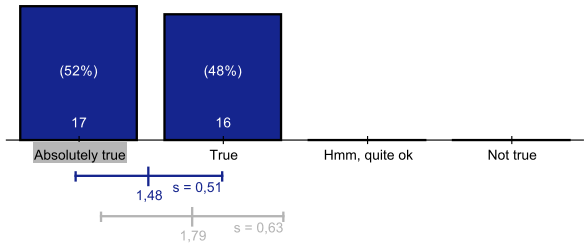
The facilitations (room, equipment etc) were



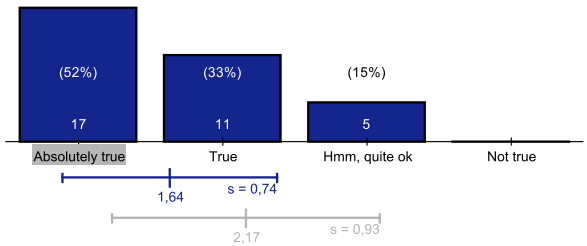
2.2. In common, the topics were (5 choices max):
A Topical (1)
B Interesting (16)
C Important (6)
D Close to my needs (1)
E Up to date (9)
F Boring (0)
G Out-of-date (0)
H Unnecessary (0)



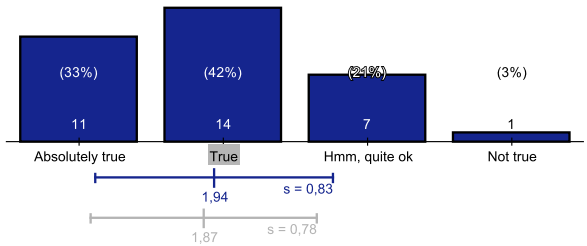
2.3. In common, the lecturers (5 choices max):
A Used interesting and motivating methods (7)
B Dealt with important topics (7)
C Were professionals in their branch (9)
D Met the expectations (6)
E Were up-to-date (4)
F Were boring (0)
G Were out-of-date (0)
H Wandered off the point (0)



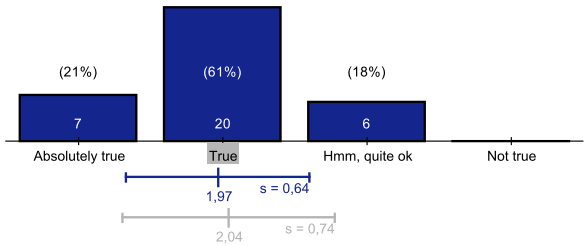
The information given was up-to-date



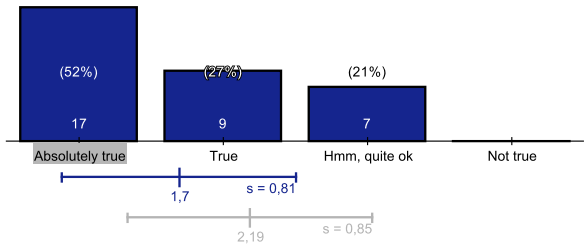
The presentation was clear and understandable



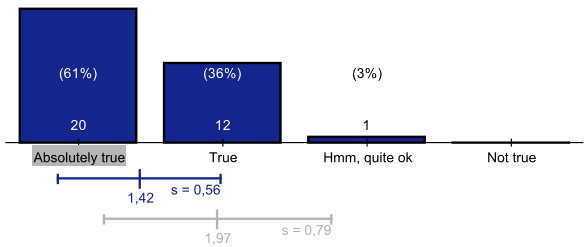
There was time enough for the topic



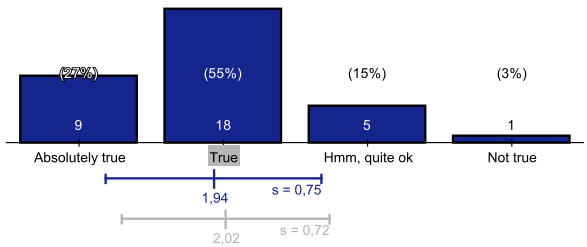
There was time enough for the discussion



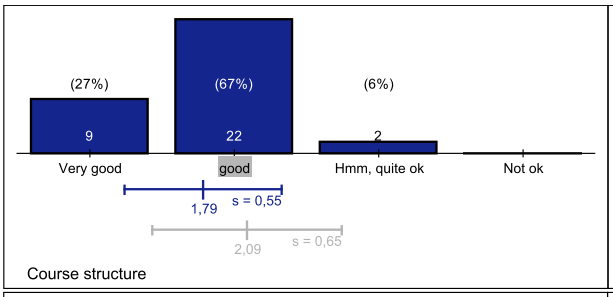
The tasks given were clear and understandable



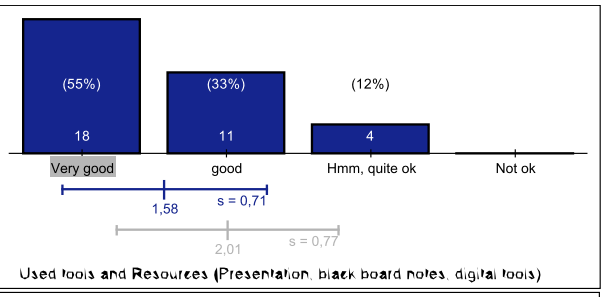
The atmosphere in the course / lessons was good and open.



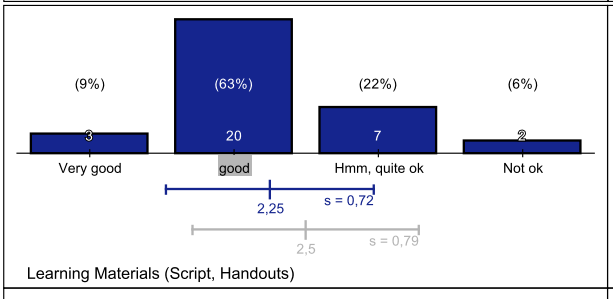
The work load was adequate



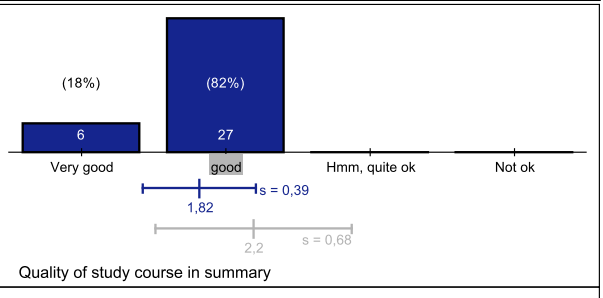
Course structure



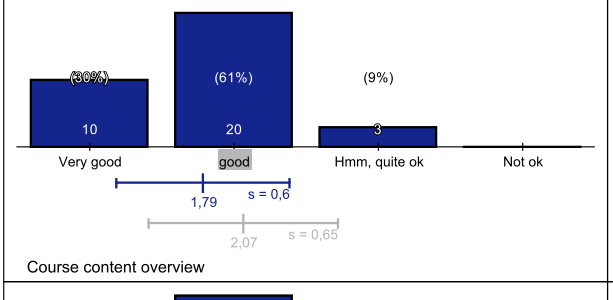
Used tools and Resources (Presentation, black board notes, digital tools)



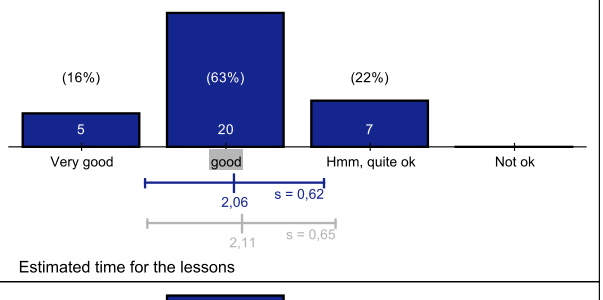
Learning Materials (Script, Handouts)



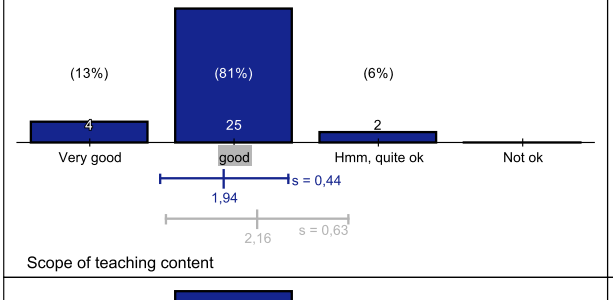
Quality of study course in summary



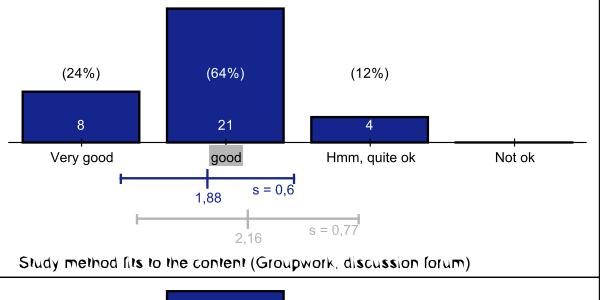
Course content overview



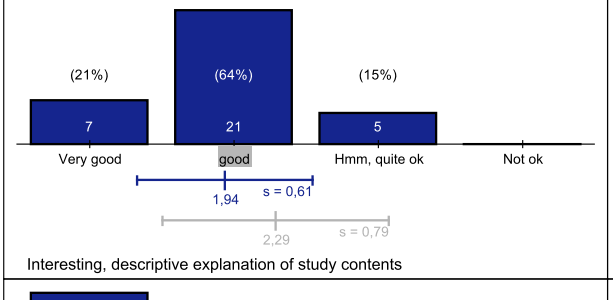
Estimated time for the lessons



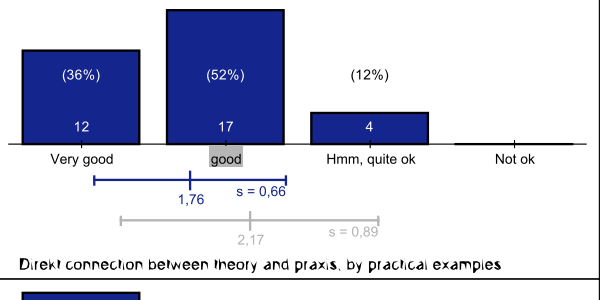
Scope of teaching content



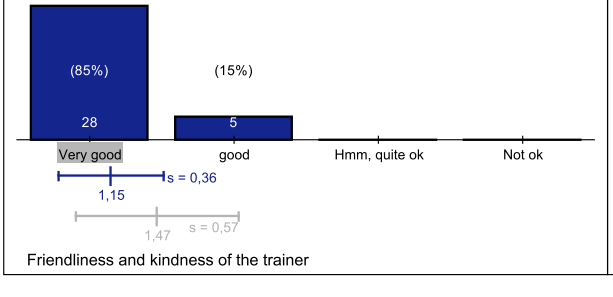
Study method fits to the content (Groupwork, discussion forum)



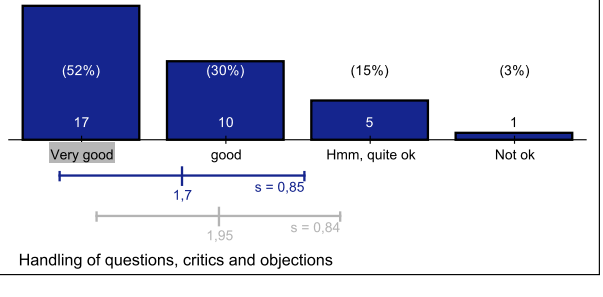
Interesting, descriptive explanation of study contents



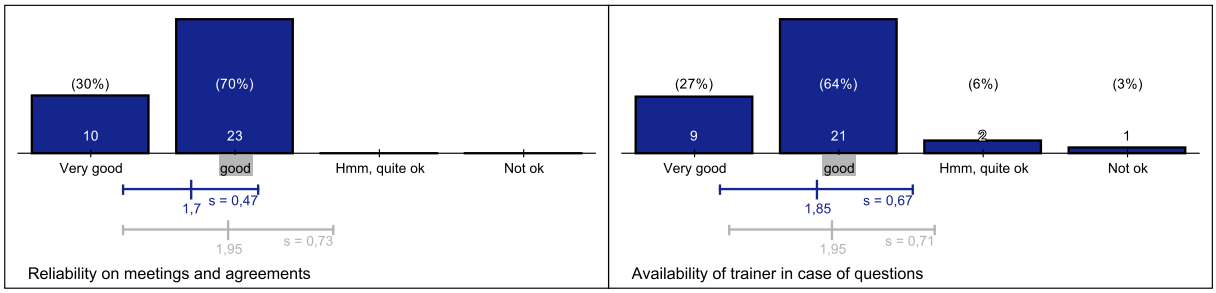
Direkt connection between theory and praxis, by practical examples



Friendliness and kindness of the trainer



Handling of questions, critics and objections



Free form answers

2.7. What would you like to say to teachers / facilitators. What could have been better, what should not be changed etc. Do you have any suggestions for improving the spatial and/or technical equipment?

- *Communication about necessary equipment (e.g. Laptop) should be improved*
- *Everything great*
- *Everything was fine*
- *More interaction with lecturer*
- *More personal interaction with foreign students*
- *More working space for each person, better dates of replacement in case of sickness*
- *Some of the information was very down to basic. Good for beginners, but less informative and somewhat unnecessary for anyone with even a little bit of experience.*
- *The lectures were very good, but it could be more intensive and interactive. The lecturer has always helped if questions have come up and has much experience in the field of Cad software*

Conclusion

In summary, students generally expressed a high level of satisfaction with the course, positively evaluated their own learning experience. Participants have learned working with Computer Aided Design. In common, the lecturers used interesting and motivating methods, dealt with important topics, were professionals in their branch, met the expectations.

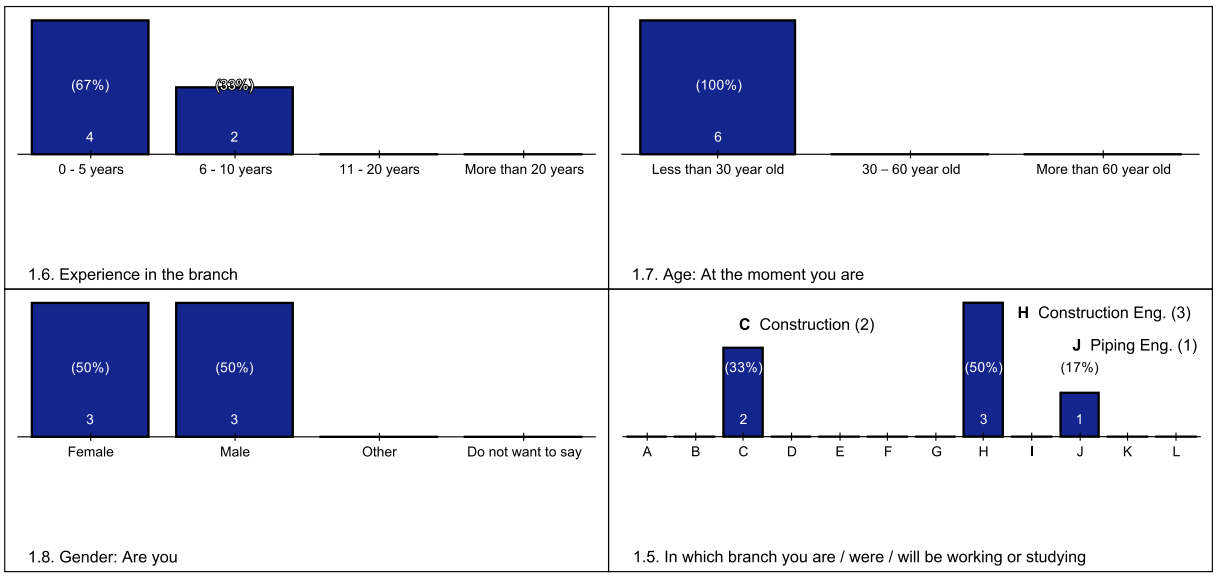
Lecturer

Since the professors are employed by the university and teach regularly, no separate written evaluation was requested. Instead, they were asked to provide a brief assessment of their course from their perspective.

The lecturer agrees on the relevance and interest of course topics and the suitability of facilitations. Overall, the feedback from lecturer provides some insights on how to improve curriculum and student engagement in future courses.

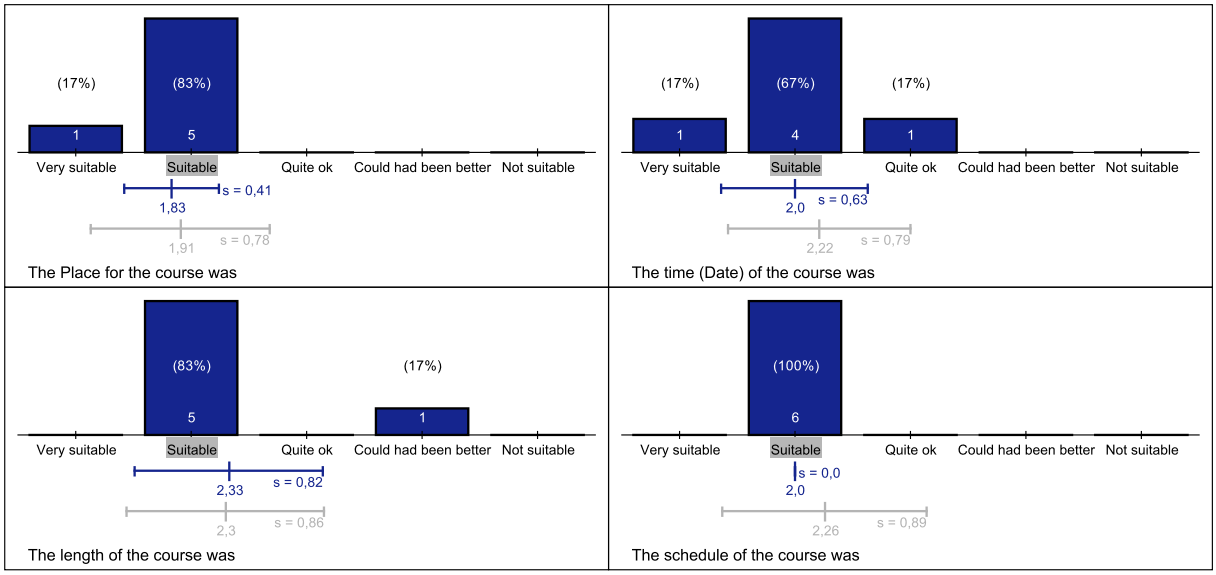
Course: BIM1 – Building Information Modelling Projekt
Participants – Students

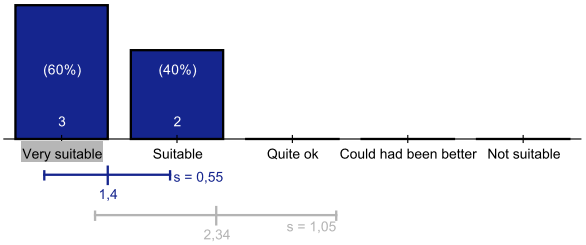
Demography



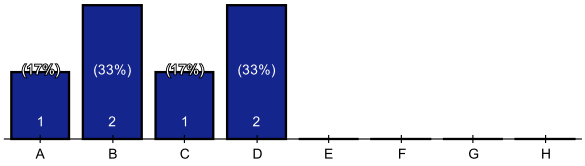
The evaluation survey was responded to by 6 students who participated the course. All students were younger than 30 years old. Regarding employment status, all students are full time students in dual study system, so they are studying and working at different companies during their years on the university. Overall, the feedback on facilitations reveals a generally positive perception among students, with a majority rating various aspects as “suitable”. Students positively assessed the place, the length, and the schedule of the training as well as the facilitations such as room and equipment.

Educational Block

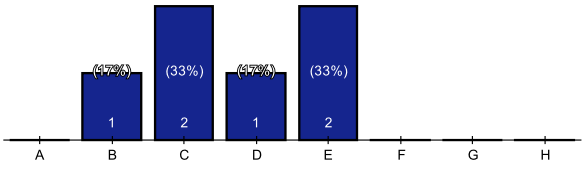




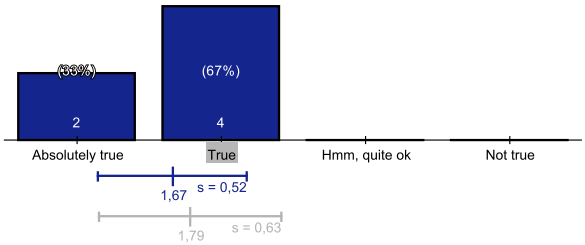
The facilitations (room, equipment etc) were



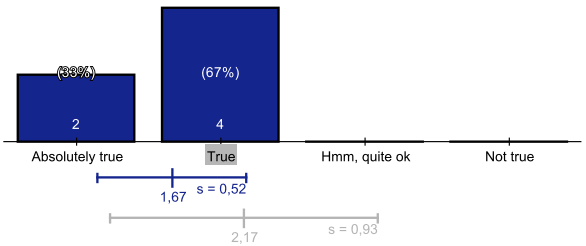
2.2. In common, the topics were (5 choices max):
A Topical (1)
B Interesting (2)
C Important (1)
D Close to my needs (2)
E Up to date (0)
F Boring (0)
G Out-of-date (0)
H Unnecessary (0)



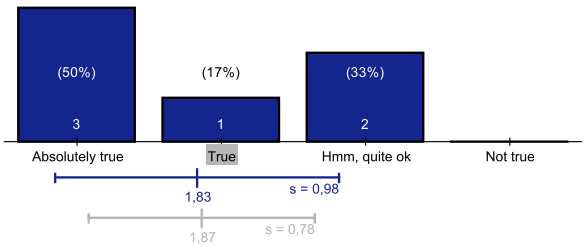
2.3. In common, the lecturers (5 choices max):
A Used interesting and motivating methods (0)
B Dealt with important topics (1)
C Were professionals in their branch (2)
D Met the expectations (1)
E Were up-to-date (2)
F Were boring (0)
G Were out-of-date (0)
H Wandered off the point (0)



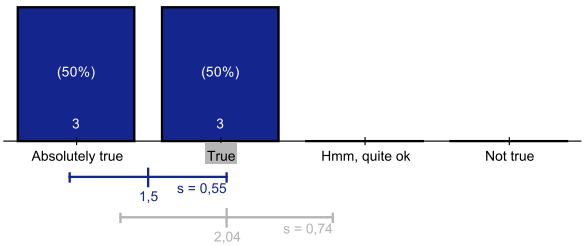
The information given was up-to-date



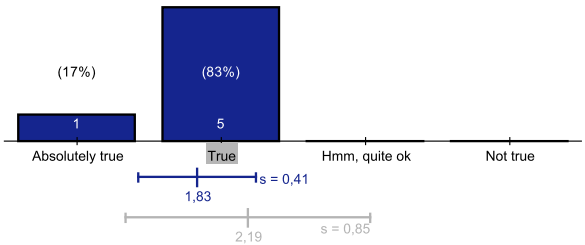
The presentation was clear and understandable



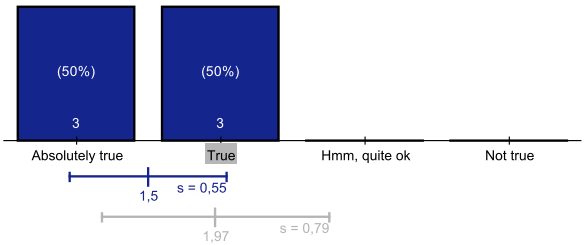
There was time enough for the topic



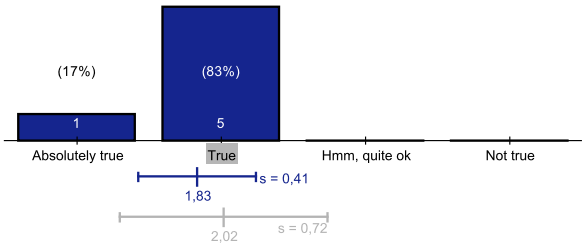
There was time enough for the discussion



The tasks given were clear and understandable

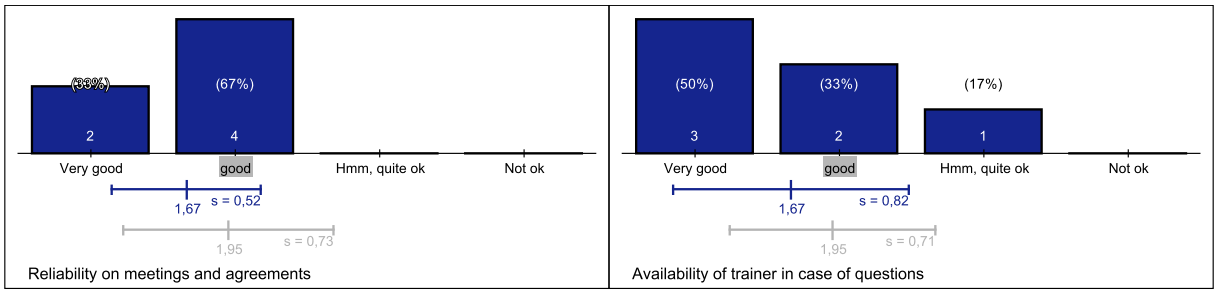


The atmosphere in the course / lessons was good and open.



The work load was adequate


(17%)
(83%)
1
5
Very good
good
Hmm, quite ok
Not ok
1,83
s = 0,41
2,09
s = 0,65
Course structure
(33%)
(50%)
(17%)
2
3
1
Very good
good
Hmm, quite ok
Not ok
1,83
s = 0,75
2,01
s = 0,77
Used tools and Resources (Presentation, black board notes, digital tools)
(17%)
(50%)
(33%)
1
3
2
Very good
good
Hmm, quite ok
Not ok
2,17
s = 0,75
2,5
s = 0,79
Learning Materials (Script, Handouts)
(17%)
(83%)
1
5
Very good
good
Hmm, quite ok
Not ok
1,83
s = 0,41
2,2
s = 0,68
Quality of study course in summary
(33%)
(67%)
2
4
Very good
good
Hmm, quite ok
Not ok
1,67
s = 0,52
2,07
s = 0,65
Course content overview
(50%)
(50%)
3
3
Very good
good
Hmm, quite ok
Not ok
1,5
s = 0,55
2,11
s = 0,65
Estimated time for the lessons
(17%)
(50%)
(33%)
1
3
2
Very good
good
Hmm, quite ok
Not ok
2,17
s = 0,75
2,16
s = 0,63
Scope of teaching content
(67%)
(33%)
4
2
Very good
good
Hmm, quite ok
Not ok
1,33
s = 0,52
2,16
s = 0,77
Study method fits to the content (Groupwork, discussion forum)
(17%)
(83%)
1
5
Very good
good
Hmm, quite ok
Not ok
1,83
s = 0,41
2,29
s = 0,79
Interesting, descriptive explanation of study contents
(67%)
(33%)
4
2
Very good
good
Hmm, quite ok
Not ok
1,33
s = 0,52
2,17
s = 0,89
Direkt connection between theory and praxis, by practical examples
(83%)
(17%)
5
1
Very good
good
Hmm, quite ok
Not ok
1,17
s = 0,41
1,47
s = 0,57
Friendliness and kindness of the trainer
(67%)
(33%)
4
2
Very good
good
Hmm, quite ok
Not ok
1,33
s = 0,52
1,95
s = 0,84
Handling of questions, critics and objections



Free form answers

2.7. What would you like to say to teachers / facilitators. What could have been better, what should not be changed etc. Do you have any suggestions for improving the spatial and/or technical equipment?

- *A bit more external practical examples and case studies*
- *Groupware (2 people) fits perfectly for the project*
- *More guides for software Student licenses should be provided for each software*
- *More time should be provided for learning how to apply all the Methods presented. Intensive lectures of theory should not have such a big part*
- *More training in other Software's. How can the topics be applied in other software solutions?*

Conclusion

In summary, students generally expressed a high level of satisfaction with the course, positively evaluated their own learning experience. Participants have learned working with Building Information Modelling.
In common, the lecturers dealt with important topics, were professionals in their branch, met the expectations, were up to date.

Lecturer

Since the professors are employed by the university and teach regularly, no separate written evaluation was requested. Instead, they were asked to provide a brief assessment of their course from their perspective.

The lecturer agrees on the relevance and interest of course topics and the suitability of facilitations. Overall, the feedback from lecturer provides some insights on how to improve curriculum and student engagement in future courses.

Conclusions and recommendations for future development

The implementation of study courses was successful. Participants and the lecturer were satisfied with the courses. The skills and knowledge the study modules gave to participants were found to be beneficial for the students and entrepreneurs. From the evaluation results, some improvements let be made. If the implementation includes many topics and many separate sub-courses, it is recommended that the schedule should be paid

more attention, and more time will be reserved for both teaching and discussion. Furthermore, the wider the implementation is, the more recommendable it is to have more teachers. The topics are so wide that it will be very hard for one teacher to prepare and lecture on all the topics.

In summary, students generally expressed a high level of satisfaction with the courses, positively evaluated their own learning experience. The few negative reviews can be attributed to the fact that the level of education and workload of the study modules at the university are relatively high and demanding. The students were challenged to learn the material thoroughly before the exam.