



Digital transformation through reflection and action in continuing education

Poulsen, Camilla Gudrun; Engmann, Marlene Williams; Khalid, Md Saifuddin

Published in:

Proceedings for the European Conference on Reflective Practice-based Learning 2021

Publication date:

2021

Document Version

Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):

Poulsen, C. G., Engmann, M. W., & Khalid, M. S. (2021). Digital transformation through reflection and action in continuing education. In *Proceedings for the European Conference on Reflective Practice-based Learning 2021* (pp. 49-58)

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Digital transformation through reflection and action in continuing education

Camilla Gudrun Poulsen, Marlene Williams Engmann, Md Saifuddin Khalid
Technical University of Denmark

Abstract

This paper reports Danish small and middle-sized enterprises' (SME's) learning and competence development on digitalization and new digital technologies through continuing education. The aim of continuing education courses in the KomDigital project, anchored at the Department of Applied Mathematics and Computer Science of the Technical University of Denmark (DTU), is to strategically facilitate participants' reflection and action in teams for digital competence development. With the goal of designing impactful continuing education, we inquire how a systematic approach to reflection and action learning in groups show characteristics of the digitalization strategy of the SMEs. This qualitative case study analyzes the observations of workshops, company documents on digitalization, and evaluation of the continuing education course of ten Danish SMEs. The companies' (course participants) reflection and action appear to have four categories of factors that characterize their digitalization profile: digitalization strategy and mindset, multiple viewpoints and common language, research collaboration and domain knowledge, and simple experimentation and adoption. In the future, based on the findings, a questionnaire tool will be developed for self-assessment of digitalization strategy for the pre-course expression of interest and post-course impact assessment.

Keywords

Reflection and action, digitalization, educational design, lifelong learning, SMEs, continuing education

Introduction

The small and medium-sized enterprises (SMEs) in Denmark are experiencing difficulties in the process of digital transformation and the sheer diversity of needs and expectations make it difficult to design and implement continuing education that can facilitate desired learning. First, Danish companies are reluctant to attend continuing education, as they do not feel that these correspond to their specific competence challenges. It shows a potential for the improvement in the current practice of continuing education courses, which target the specific challenges companies face during their digital transformation processes. Secondly, SMEs often lack time due to their focus on daily operation and therefore cannot prioritize continuing education (REG LAB & Digital Transformation, 2018).

The KomDigital project aims to strengthen SMEs' strategic and operational ability to utilize the opportunities in digitalization through the development of a customized continuing education concept considering the companies' daily operations. KomDigital project is a collaboration of eighteen companies, organizations, and educational institutions from the capital region of Denmark. During 2018-2019, a new design of continuing education was developed and tested. During 2020-2021, the project is facilitating companies through customized and growth-oriented continuing education program for digital competency boost in SME's. EU funds the project and offers free courses for competency boost. Participants fulfil the requirements based on the company's digital maturity and motivation towards digitalization.

Since SMEs' are heterogeneous in their digitalization strategy and practice, each of the courses has been custom-designed based on different needs and expectations. In this study, we are interested in understanding the differences and similarities of the digitalization strategy observed during the process of designing and conducting the course. Thus, we devised the following research questions:

How are the SMEs different or similar in their digitalization strategy as evident through reflection and actions during a continuing education program?

The Design of KomDigital continuing education

The design of the KomDigital continuing education is inspired by REG LAB, which is a member based “laboratory” in Copenhagen for regional economic development. REG LAB (2018) pointing out a need for hands-on and practical initiatives with focus on leaders' digital mindset and employee/team involvement in the digital journey, both mentally and by competence (REG LAB, 2018). The competence profile for employees in companies in digital transformation should be characterized by problem solving, collaboration and expertise in the context-given domain (Hanne Shapiro Futures & Finansforbundet, 2019). Team and group learning in SME's are often characterized by action- and experiments, the accumulation of incremental knowledge and experience of ‘what works’, and while shared with others (Rae, 2006). In the KomDigital project, it was therefore essential that a course design process be made not only to make the learners become ‘do’ers’ but also ‘reflective practitioners. The learners will not replicate but rather have the ability to work with problems of a developing nature in the settings of learning teams.

Social constructivist starting point

To develop the customized continuing educational design that is hands-on, team based, strategic and problem solving we found inspirations in two theoretical traditions from the social constructivist paradigm:

Firstly, applying Dewey's pragmatism (Dewey, 2009), we had a theoretical framework on a learning process that would start with an *experience* at the university followed by *reflection*, *conceptualizing* and *experimenting* in the company context. We refined the process with principles from action learning (AL) defined as team-based learning *in* and *of* practice, when a learning group of employees with the greatest possible diversity works with a complex and real challenge that does not have a known solution (Pedler, 2016). With scaffolding by a facilitator, goals are set, the problem is narrowed, a plan for actions is drawn up and it is negotiated which questions need to be answered before the actions can be performed. In addition, adding AL consulting that brings a business perspective in the design with the concept of *strategic intention* that captures the need for a focus on *outcome* (Molly-Søholm et al., 2014).

Secondly, applying the concept of Reflecting Teams (RT) in AL - activate listening, reflection, diverse perspectives and tacit knowledge in the learning group. By applying systems theory and questioning types (Tomm, 1988), we wanted to scaffold the emergence of new understandings, perspectives and solutions on digital problems in reflective teams (Madsen, 2013).

The question types used was:

- What did you see happen?: Linear and simple questions oriented towards the past (clarifying, defining and investigative)
- What other positions would also be possible?: Circular and complex questions oriented towards the past (relations, patterns, different positions and perspectives)
- What would it look like if...?: Reflective and complex questions oriented towards the future (possibilities, hypotheses and best-case scenario)
- So, what are you doing now?: Strategic and simple questions oriented towards the future (Leading, confrontational and inspiring)

The KomDigital continuing education design

Based on the theoretical starting point, the design of the continuing education program builds on the following activities that take place over 2-4 months (see Figure 1):

1. A dialogue meeting with manager and 1-2 key employees from the company, expert from DTU Compute and a business facilitator. The goal is to form a more or less customized competency development plan and adjust contents to match each company's needs. Before starting the process, the plan must define company's digitalization strategy (**Strategic Intention, SI**) that

facilitates the transformation process to implement specific technologies in the product or service innovation.

2. A group of learners from the company consisting of both management and key employees participate in three workshops eg. AI, UX, Machine Learning, Data driven Innovation, Blockchain, IoT, etc. Researchers at DTU with competence in new digital technologies conduct the digital workshops.
3. The learning group participates in two company-located AL-workshops with **Reflecting Team (RT)** as key method. AL-consultants with competence in learning processes facilitates the AL-workshops. All companies enter the project with a strategic intention, and it is this intention that sets the framework for the action learning process and the curiosity it calls for in the learning group. The focus is on: What do we already know from our practice and what new knowledge have we gained that can create hypotheses that can lead to experiments and actions. In the first action learning workshop (step 4) reflection focuses on hypotheses and formulating actions, and in the second (step 6) workshop reflection focusses on the observation and data from performing the actions and what that gives rise to.

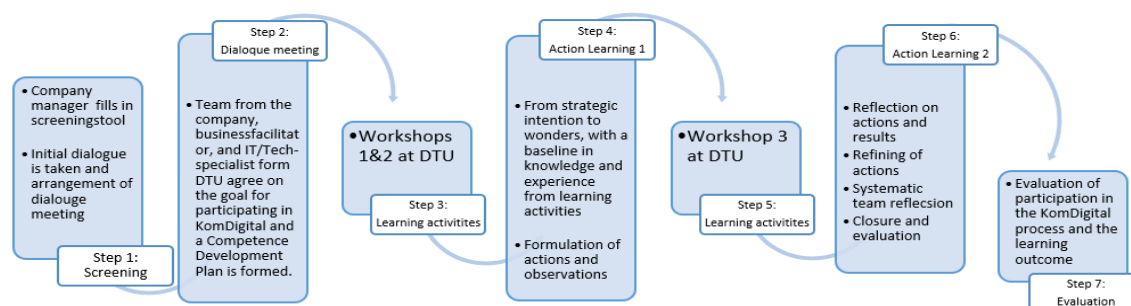


Figure 1: KomDigital design for continuing education.

Methods

In this study, we looked at ten SMEs representing financial, production, start-ups and service segments. Case study is an obvious methodological choice, because it is defined as an approach used when the phenomenon one wants to investigate is not easy to define. For instance, Yin (2011) defines case study as:

“An empirical inquiry about a contemporary phenomenon (e.g. a “case”), set within its real-world context - especially when the boundaries between phenomenon and context are not clearly evident.” (Yin, 2011, p. 4)

The central concept of competence development also makes it necessary to choose a research design that can address such a phenomenon: How is it possible to locate digital competence development leading to digital transformation? How do we in this study locate something that takes place between humans and technologies, and how can it be the subject of investigation?

The cases used in this paper are constructed from screening documents stating company’s strategic intentions (step 1 & 2 in the process, Fig. 1), semi-structured observations on digital- and action learning workshops (step 4 and 6) and from participants qualitative evaluation (step 7). The approach in the analysis is inductive, constructing new theory based on data in the cases (Brinkmann & Tanggaard, 2010). The analysis is based on a schema, which was constructed by looking at the data material collected in step 1-7. While looking at how each case participated at each step of the entire continuing education program, we developed categories from asking 1) What is the most essential intention on developing digital competencies and digital transformation (step 1&2)? 2) is focus and engagement in action high or low (step 4&6)? 3) is focus and engagement in reflection high or low (step 4&6)? 4) How do participants describe perception of learning outcome (step 7)?

Results

Through an inductive analysis, we categorized the companies' different reflections and actions during the continuing education process and the outcomes in four modes or learning profiles of the companies.

Digitalization strategy and mindset: Company A and B

The action learning process in these companies contributed the sparring of ideas and perspectives rather than leading to concrete experiments and actions. Company A formulated the following strategic intention during the initial dialogue meeting:

"We want to gain greater knowledge and understanding of opportunities with different technologies, both at management level and broader in the organization."

This type of strategic intention taps into a company strategy regarding a general development of digital competencies and a desire for a general impartial introduction and an overview of the potentials and challenges of relevant technologies. When the learning group does not formulate a specific problem, it is hard for them to formulate concrete actions, because the focus is on a much broader level, which we see as an expression of focus on **Digital mindset and digital strategy**.

These companies seem to benefit from gaining new knowledge on digital technology from the workshops with DTU researchers - and less from the action learning workshops, as evident in the evaluation of Company A's learning outcome:

"It has been the most important to gain insight into new technologies."

It is the sparring and dialogue with researchers at DTU that seem to inspire and support the reflections and the planning of organizational efforts.

Common language: Company C, D, and E

In these companies, the learning groups were investigating different approaches to digitalization and the use of data when discovering new business territories. Company E's strategic intention was:

"We want to have a conceptual apparatus and language that can form the basis for asking the right questions about technology/digitization and look into the opportunities of Internet of Things for value-creating products and services."

This type of strategic intention shows the desire for a common knowledge and overview of relevant technologies. During the first AL workshop (step 4), we saw that the facilitated reflection in the learning group activated tacit knowledge and was scaffolding development of **common language** and direction within the company.

When it came to formulating actions, we saw a strong focus on investigating how to involve customers and other partners in development of new products/services driven by artificial intelligence, data, etc. The characteristic of these companies' actions was that they were on a level of preparing/scooping more thorough investigative work based on hypotheses and reflections structured in the action learning process. They seemed to benefit from reflecting on their current practice as a way to "take a step back" and look at existing practices and workflows; Why do we do as we do? What are the opportunities to make product development in the future? Furthermore, they seem to benefit from the facilitated AL process on questioning and reflecting on (digital technology) theory and creating hypotheses, which were expressed in the evaluation of Company E's learning outcome:

"Good with a structure that mixes new knowledge and actions in own practice, and good to be maintained and reflect structured on the action learning workshops."

Simple experimenting: Company F, G, and H

This characteristic of *simple experimenting* type of companies are acting and experimenting within the praxis they know. The strategic intention of company F was:

"We want to create growth through increased quality and lower costs through more cost-effective and flexible production and order execution. Among other things, through AI in various processes to reduce errors and also by increasing market share through increased customization."

This type of strategic intention indicates a direct potential for development with digital technologies and exploring the ways to go by experimenting. On the first AL workshop (step 4) we saw that the facilitated reflection in the learning groups helped making the “low-hanging fruit” among the further digital development directions visible and contributed to actual experiments - especially with a focus on developing and testing new services on relevant partners and customers by **simple experiments**.

The facilitated questioning session scaffolds reflection and enables tacit knowledge to be explicit. They benefit in particular from reflecting together during the two AL workshops. New group positions emerged that brought out new perspectives on the experiments, and questions were asked that led to deeper and broader dialogues than usual. This is expressed in an evaluation of one of the company G’s learning outcome:

“Although work was done on issues that have been known and discussed before, new perspectives and opportunities for action are added when working with reflective teams and actions. As a result, we have acted on some things that we have only talked about so far.”

Complex experimenting: Company I and J

In this type of companies, we saw a focus on concrete and specific development of existing products and services by **complex experimenting**. In company F, the following strategic intention was:

“We want automation of shift planning - customization and maintenance, which requires minimal administration from our customers.”

This reveals an ability to translate input and methods from the technology workshops very directly and develop new and existing services or prototypes. Common for these companies is that they have data competencies in house that has enabled this very direct transfer. Here, the action learning process mainly functions as a structural framework with deadlines, which has maintained momentum in a busy company, where development projects often is downgraded as opposed to daily operations.

The learning process is characterized by acting and experimenting with new digital technologies in collaboration with researchers and students at DTU- challenging and supporting the process of development – this is expressed in an evaluation of one of the companies learning outcome:

“The KomDigital process has sharpened our focus on UX as a central part of our company's DNA. In addition, the course has also challenged our way of analyzing critical process data and provided a new perspective on how we can continue to work with time series analysis. The combination of the user-driven approach and the deep technical insight has undoubtedly made the KomDigital process a very valuable for our company.”

Discussion and future work

Fig. 2 summarizes the learning profiles of teams and their reflection and action process during continuing education on digital competencies. The learning profiles show to what extent the company benefits mostly from reflecting or acting. Profile 1 & 2 are more oriented towards discussing opportunities/hypothesizing impact of digitalization (reflection), profile 3 & 4 are oriented towards experimentation with new technology (action). Among those who were oriented towards hypotheses, two types emerged: 1) Focus on organizational aspects and reflection on developing own **digital strategy** with very little interest in experimenting with new technologies and 2) Focus on general knowledge about new technologies and creating a **common language**. Among those who were oriented towards action and experiments, focus was on how specific technologies can develop new and better product and services. Here we also saw two different categories emerge: 3) **Simple experimenting** and 4) **complex experimenting**. Fig.2 also shows to what extent the participants benefit from a linear or a circular facilitating approach. The linear approach is when participants benefit from the guidance and directions from researchers’ knowledge, and the circular approach is when the participants benefit from being researchers in their own practice and only guided by facilitating questions.

We propose the learning profiles of the SME teams as a theoretical model (Fig. 2) for differentiated facilitation and appropriate prioritization between reflection and action.

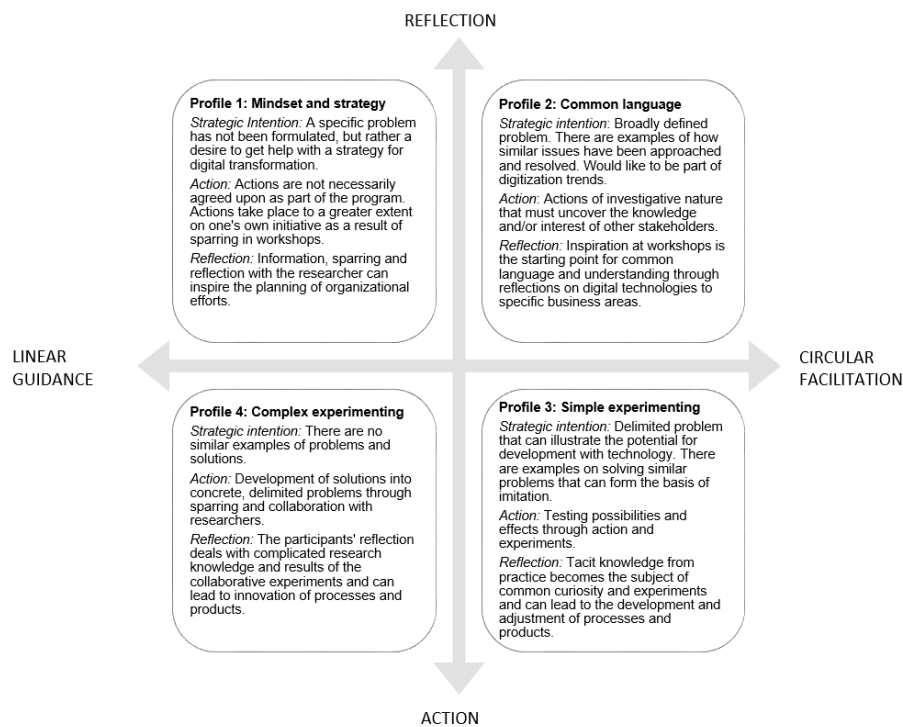


Figure 2: Typology of four different learning profiles of SME teams in continuing education on digitalization

Towards providing effective continuing education and aligning the learning goals of teams, the findings have contributed to identifying the similarities and differences in learning profiles of teams from SMEs, which paved the way for developing questionnaires as tools for need identification, digitalization agenda-setting, and self-reflection tool for team development through reflection and/or action.

References

- Brinkmann, S., & Tanggaard, L. (2010). *Kvalitative Metoder: En Grundbog*. (1. udgave, 3. oplag, Vol. 2010). Hanz Reitzels forlag.
- Dewey, J. (2009). *Hvordan vi tænker: En reformulering af forholdet mellem reflektiv tænkning og uddannelsesprocessen*. Klim.
- Hanne Shapiro Futures & Finansforbundet. (2019). *Indsigter fra danske virksomheder*. https://www.finansforbundet.dk/media/j3fhwnlh/indsigter_fra_danske_virksomheder.pdf
- Madsen, B. (2013). *Aktionslæringens landskab: Med fokus på de senere mange års danske AL-miljøer*. VIA University College, CLOU-Center for Ledelse og Organisationsudvikling.
- Molly-Søholm, T., Willert, S., & Molly-Søholm, T. (2014). *Action learning consulting: Strategisk proceskonsultation i teori og praksis*. Dansk Psykologisk Forlag ; [Eksp. DBK.
- Pedler, M. (2016). *Action learning in practice*. Routledge. <https://www.taylorfrancis.com/books/e/9781315565521>
- Rae, D. (2006). Entrepreneurial learning: A conceptual framework for technology-based enterprise. *Technology Analysis & Strategic Management*, 18(1), 39–56. <https://doi.org/10.1080/09537320500520494>
- REG LAB & Digital Transformation (projekt). (2018). *Inspirationskatalog til digital transformation af danske SMV'er: Anbefalinger og internationale policy-initiativer*. REG LAB. <https://reglab.dk/wordpress/wp-content/uploads/2018/06/del-rap-3-enkelt.pdf>
- Tomm, K. (1988). Interventive Interviewing: Part III. Intending to Ask Lineal, Circular, Strategic, or Reflexive Questions? *Family Process*, 27(1), 1–15. <https://doi.org/10.1111/j.1545-5300.1988.00001.x>
- Verenikina, I. (2008). Scaffolding and learning: Its role in nurturing new learners. *Faculty of Education - Papers (Archive)*. <https://ro.uow.edu.au/edupapers/43>
- Wahlgren, B. & Nationalt Center for Kompetenceudvikling. (2009). *Transfer mellem uddannelse og arbejde*. NCK.
- Yin, R. K. (2011). *Applications of Case Study Research*.