Innovative Learning Cultures in VET – How 21st century skills are developed.

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This study focuses on how apprentices in Swiss enterprises are socialized within a new learning culture and how they acquire 21st century skills, such as collaboration, flexibility and communication. A key issue in the study is how learning processes are managed by the apprentices, their coaches, supervisors and vocational education and training (VET) managers. Based on a qualitative comprehensive case study within one large enterprise in the telecommunication sector insights have been gathered into the character of an innovative learning culture within VET, that is into attitudes, values, beliefs and practices within the company that support and encourage learning at the workplace. The guiding questions for the presentation are: Which structures and practices for the development of 21st century skills are innovative and how are they interpreted by different stakeholders within a sector specific learning culture? Two frameworks are relevant. For one the development of innovations in the training companies and on the other hand the development of innovations in pedagogy. New forms of training are initiated in companies, because they are innovative or have to become innovative. If companies are innovation-oriented, this can have an influence on the training in the company (e.g. ways of communication, workplace structures). The workplace training is than adjusted, so that it fits the development of the whole company.

1. Introduction

To understand innovation in VET two frameworks are relevant. On the one hand, innovations evolve in apprenticeship training due to the organizational innovation within an enterprise. On the other hand, pedagogical innovations at school are relevant to ensure a knowledge transfer between the different learning places. Both types of innovation may change the ways in which knowledge and competences are developed throughout an apprenticeship.

Innovations in enterprises are often a consequence of external competition. They can be structural innovations (forms of work organization), but also cultural innovations (communication among co-workers or across hierarchies). Mostly, innovations that concern apprenticeship training are a consequence of innovations that are generally taking place within enterprises (e.g. agile forms of working, such as scrumming, working in squads, see Author et al. 2019; Link 2014). In many cases, with changing work organization, as well as changing values and attitudes, workplace training of VET learners in the companies is adjusted to the new workplace and learning culture. This leads to innovative forms of training that fit contemporary forms of work and corresponding challenges.

The term learning culture refers to the embeddedness of learning in the interaction between context, concept and reality (Brown et al. 1989) and relies on the idea of learning being embedded within cultural settings and the utilization of cultural resources (Bruner 1996; Hodkinson & James 2003). It entails structural components, such as learning environments as well as practices and procedures shaping a learning culture. And, it includes the study of attitudes, values and beliefs among practitioners involved in training and of the apprentices themselves. Both are constantly influencing each other.

The ICT industry has seen a significant growth in Switzerland and belongs today to the 10 largest industries in the country. At the same time, the industry is experiencing a rising complexity in its sector, including a variety of new competence requirements for its

staff. New job profiles have emerged, such as “mediamatician” [Mediamatiker], who works at the interface between marketing and computer science. Generally, apprenticeships in the telecommunication sector are seen as very challenging. In these areas, a high intellectual capacity is needed in order to acquire a Federal VET Diploma in media or information technology. The increasing connection of humans and machines, changing customer expectations and increasing significance of data security requires from enterprises to always be up to date and also to drive innovation forward. The enhanced tempo leads to a high innovation pressure. This is why good communication skills and flexibility, new ideas and openness to co-workers and changing teams are highly required. Themes, such as artificial intelligence, industry 4.0 or Smart City call for imaginativeness and technical knowhow. Innovation is what counts to stay relevant in the business, to grow in certain domains and to digitalize internal working processes (Author et al. 2020, in press). This dynamic of change in enterprises requires from employees, that they continuously acquire new competences. People increasingly work at flexible times and places. New working methods provide more variety in the working live. Temporary and project-related work is advertised, in some cases on virtual job platforms.

The overall question is, how future workers can be prepared for the accomplishment of transversal competences throughout their apprenticeship in Switzerland, which innovations does the industry implement to improve workplace training and how are these changes experienced by the apprentices. The paper presents results from a case study undertaken within a large telecommunication enterprise in Switzerland that stands as an example for having developed a new learning culture that addresses the development of 21st century skills in innovative ways.

2. Literature review

Since the arrival of the discussion around the need for the development of 21st century skills (e.g. critical thinking, creativity, collaboration, communication; flexibility see Chalkiadaki 2018), the importance of transversal skills has been increasingly recognized. In Switzerland, where the majority of young adults are prepared for jobs by graduating from an apprenticeship in about 230 professions, transversal skills have become either explicitly or implicitly part of VET framework curricula. None of the 21st century skills exist independently, they are rather working with one another. Therefore, they all play an important role in the development of action competence (Lai, Yarbro, DiCerbo & deGeest 2018; Rauner, Heinemann & Maurer 2013). In VET, 21st century skills are classified as interdisciplinary competences, which must be taught transversally, i.e. at all places of learning (Scharnhorst &Kaiser 2018).

Despite the high recognition of these skills not least due to the demands by the economy, 21st century skills are also viewed critically. It is often argued that they are not new skills, but can be traced back to the writings of Socrates, Plato and Aristotle (Paul et al. 1997). Beyond that, Rose (2009), for example, criticises that the educational philosophy of 21st century skills is purely economic, with the primary goal of training particularly efficient workers. Education, however, has the task of promoting different human abilities equally. According to Rose (2009) important aspects of a good education like “aesthetics, intellectual play, imagination” etc. are missing. Another point of criticism is that 21st century skills are partly contextual or content-dependent. For example, creative and critical thinking in mathematics does not automatically lead to the same in English (Lamb et al. 2017), thus transferability is relative also for these competences.

Nevertheless, the emphasis on 21st century skills draws a turn in VET, because enterprises are starting to change their internal learning culture to better prepare young

people for these skills. The learning culture within an organization with its specific structural conditions that have been created and the attitudes, beliefs and values of all stakeholders involved (Author et al. 2019a, 2019b) is decisive for competence acquisition.

A key issue for enterprises is how they can manage learning processes. For organizational management, the conversion of individual knowledge, as much as values and beliefs, needs to be turned into explicit forms, so that it is available to all members of the organization and not susceptible to loss when individuals leave. One of the consequences of this philosophy is that organizational design needs to shift from hierarchical structures to new organizational forms such as networks and team working (Ashton & Sung 2002; Billett 2001; Birdi et al. 2008; Eraut 2004) already for the apprentices, so that knowledge is more easily acquired and maintained. Levitt and March (1996) argue that organizational management requires the conversion of individual knowledge into explicit (common) forms. This leads to prescriptions to do with codifying and proceduralizing knowledge so that it is available to all members of the organization and not susceptible to loss when individuals leave. One of the consequences of this philosophy is that organizational design needs to shift from hierarchical structures to new organizational forms, such as networks and team working. The personal (tacit) knowledge acquired within the enterprise also makes it attractive to keep apprentices after their training.

One of the new paradigms for modern forms of work refers to group learning and sharing of knowledge (Perkins 1992), instead of focusing on the individual learner and what she or he can achieve by their own means (Kolikant 2010). Therefore, a new learning culture needs to nurture team work even more than it was done so far. The ways in which this is playing out throughout an apprenticeship depends on the outcome of a regular negotiation between individual needs and organizational requirements. Next to intuition and creativity, flexibility and openness towards new things will be decisive qualities desired among workers at the labour market, because this is what the human being differentiates from machines (in Deloitte 2017; also see Arnold et al. 2016).

The borders between work and home are more and more flexible as workplaces become increasingly digitalized. New models of working hours and workplace management are emerging. The employee has more flexibility in determining ones organization of work. And, similarly, also times for learning are flexibilized, which is especially relevant for the telecommunication industry (Keuper et al. 2013). A key feature in flexibilized work and learning cultures is ‘agility’. The term was originally conceptualised for the business of programming software, but it was soon been adopted in other sectors and functional areas (Graf et al. 2017). It became known through the concept of ‘agile manifest’ introduced by Beck et al (2001) and consists of multiple organisational concepts, which are continuously extended and modified (Hooper et al. 2001).

Open communication systems are promoting fast transfer of ideas, which stimulates the innovation process itself. While the normative and strategic levels are oriented towards the design of regulatory frameworks; the operative level represents the execution of new or hybrid approaches (Bleicher 2011, Erpenbeck & Sauer 2001), which entail new forms of learning and accompanying learning. Finally, all levels need to be considered when working on a new learning culture in VET (Aarkrog 2005, Hammerman & Stettes 2016). They are also constitutive factors for shaping apprenticeships within the Swiss telecommunication industry.

Research shows, that transversal competences, such as collaboration, flexibility and communication are highly relevant within modern learning cultures. They need to be

built throughout apprenticeships. While collaboration is mainly referring to team work, the need to change teams more often as well as workplaces and work tasks requires a higher amount of flexibility than it has in the past. The navigation process itself is best managed with good communication skills, not just in terms of mastering languages of different professional domains, a diversity of colleagues, but also (especially in Switzerland) the three mainly spoken national languages (German, French and Italian). How this is implemented within an exemplary telecommunication enterprise in the country offers insights that not only help to understand what constitutes an innovative learning culture, but also develop a good practice example for inspiring other employers.

3. Research method

To characterise the learning culture of the innovation-oriented enterprise a case study design was applied. Case studies allow to take a holistic perspective at an object and are particularly suitable, if the connection between a phenomenon and context is not evident (Yin 2014), or when particular contextual conditions are relevant for understanding a case (Yin & Davis 2007). Case studies are not representative in a statistic way. Rather the aim is to understand a complex social phenomenon, to get an in-depth description of the case and to understand 'how it works'. In case studies, data from different sources and different perspectives are included. In addition, analysing several cases, e.g. how companies modernize VET training due to new competence requirements provides further information (pursuit of replication through multiple case studies) (Yin 2014).

In our case study, the subjective level of knowledge of the participants was of interest throughout the data interpretation. To understand the learning culture, it was essential for us to understand motivators and anchors for orientation among those involved in VET. We wanted to know how the learning culture is lived instead of what might be officially communicated about it. Relevant for our understanding was the implicit knowledge, which serves as a point of reference for any action.

Throughout the study a wealth of insights into the ways in competences are acquired within an innovative learning culture have been collected. The goal of the inquiry was to gather information about attitudes, beliefs and values of individuals involved in the pursuance of apprenticeships in order to understand the parameters and constituencies of the current learning culture. Another goal was to determine which structural conditions are considered as innovative and how they have an impact on the new learning culture. We were particularly interested in structures intended to support the development of collaboration and communication skills as well as flexibility.

The following two research questions are addressed in this paper:

Which structures and practices for the development of 21st century skills are innovative? How are they interpreted by different stakeholders within a sector specific learning culture? Data were collected from March to July 2018. To study the case, a multiple method approach has been taken. In total, we conducted semi-structured interviews with 20 learners in VET programs as IT specialist, ICT specialist, interactive media designer, commercial apprentice, retailing specialist and customer dialogue specialist. Interviewed were also five coaches, who accompany and somewhat guide learners through their apprenticeship and three regular workers that work together with the apprentices within specific projects. Additionally, we interviewed four members of management responsible for VET. The three interviewers used a common interview guideline, which differed somewhat for the different professional groups. In conducting the interviews, they aimed at provoking narrations on experiences of the interviewees in the framework of VET at the

enterprise, related to everyday tasks, successes, difficulties and important or special events that they remembered. The interviews lasted between 30 and 45 minutes (learners), respectively between 45 and 90 minutes (coaches, regular workers and management). The interviews have been audiotaped and transcribed. In addition, the three researchers conducted observations at different branches in the French, Italian and German speaking parts of Switzerland and compiled protocols about the research teams' observations. Especially locations and projects considered as being particularly innovative were visited. The data analysis of the transcripts, field notes and company documents was guided by content analysis (see Kuckartz 2016). This entails to structure the material in two dimensions: On the one side are cases, mainly individuals who were interviewed or groups of interviewees, on the other side, categories representing different research topics.

In the first step of data interpretation the documentary method according to Bohnsack (2013) has been applied. After a first inspection and review of the collected material, a part of it was coded with a primary set of codes (see table 1, central codes of the data analysis). These codes have not been chosen based on pre-existing categories or theories, but because of the emerging major themes from the collected material (inductive development of categories). The coding system then was updated in a constant process based on subsequently emerging themes. In this way, a comprehensive and detailed system of categories was derived and applied in a second round of coding the total material. Additional proposals for codes were negotiated within the research team, especially concerning sub-codes. Emerging themes and subthemes have been identified on the level of "immanent sense making". It refers to consequently remaining on the relevance system of an individual as well as the group of apprentices. Of interest were individual orientations and the realities that apprentices described based on their experiences. The interpretation is therefore based on the framework of the actors. We looked for text sections in the transcripts that present a picture or are metaphorical. Based on these findings the team started a process of reflective interpretation.

Reliability and validity have been established by coding the data in the team, the collective analysis of the data, starting with the development of a coding scheme, the coding itself as well as the interpretation and analysis of emerging themes. Informed consent has been collected of all participants and they have been informed about anonymity and confidentiality regarding the data. A data management plan has also been developed.

The telecommunication enterprise Swisscom has over 17.000 employees, of which approximately 900 are apprentices, who are called 'learners'. In the year 2018, 483 learners worked in information and technology occupations (ICT occupations). The enterprise has restructured the VET training at the workplace beginning in 2003. According to Ghisla & Zgraggen (2004) the reorganization of VET was initiated because of major societal and economic changes, as well as changed expectations towards VET. The main goal of the restructuration was that the existing approach to VET would become more dynamic. The basic element of the new training structure in VET is that the learners complete their apprenticeship in the form of changing individual projects, of which most last between four and six month. The learners search projects at the firm-intern «marketplace», an online-depository that all employees in the company can access and advertise projects for learners. Applications are competitive and it is challenging to enter particularly interesting projects. In case learners cannot acquire a place in a project, they may work on tasks independently as preparation for a new project. Learners can choose new challenges, take initiative, work creatively, and get to know a large number of employees and different tasks and working environments. They become familiar with new

forms of work organization, such as flexible working hours, telework and the work in different language regions of Switzerland. In addition, learners can work in environments that support innovative work, for example co-working spaces, or they can use «Kickbox», a tool for gathering ideas of employees, of which the best are realized.

4. Findings and discussion

In this section the ways, in which the three transversal competences collaboration, flexibility and communication are addressed by different stakeholders, is outlined. It focuses selectively on some aspects that indicate how the experience of the apprenticeship is shaped by new structural conditions as much as different attitudes, values and beliefs.

4.1 Collaboration

> *«There is always team work, such as the event-team, the sponsoring-team, which are extremely open and different. You need to have a bit of a young spirit vice versa a team that works more technical where you are more quiet at your PC.» (Apprentice)*

The large majority of work is done in teams. Since the entire apprenticeship is based on project work and mostly apprentices change between projects every 6 months, they have a wide exposure to different teams. There are teams, which consists mostly of apprentices, while they might be the only one in another team.

> *«Today, we work in very agile teams. There are no predetermined bosses, but instead one is chosen, for example, when we use the scrumming method. We work in different units, called 'squats' and need to solve a problem together. « (Coach)*

> *«Everyone is part of a bigger picture. We are working together on one common goal and there a boss is not needed anymore, because the boss would also be part of this picture.» (Apprentice)*

Agile working methods are employed, roles within teams are changing and apprentices get to know different forms and modes of work. They also learn how to take over different roles, how to cope with hierarchies as much as how to work on strict deadlines set by teams. In this way ones role is constantly renegotiated and the skills to adapt to changes and new requirements in order to successfully collaborate also requires flexibility and good communication skills.

4.2 Flexibility

> *«The technological change in our area is enormous. This also means that the knowledge quickly gets old. What we need, are people with strong social skills. Because today nobody works alone. Today, you work in teams with people from different nations, really different people, and you have to find a way how you can work with them.» (Coach)*

Agility is central to the new learning culture in apprenticeships at the enterprise. Working in different projects, environments and with different people requires a great amount of flexibility. Since all projects are real and take place where the work is needed, this may also require working in different language regions of Switzerland, which encourages apprentices

to learn German, French, or Italian. A few apprentices may work in projects within external firms, even outside the country. A coach points out:

> *«I am convinced that every person, it does not matter where he stays, can be further promoted and challenged. This pays off. I had apprentices, who worked in a project in London or at a company in Rotterdam to program things. These are possibilities that evolve among the top performers, if you show them what is possible they are motivated.»*

The readiness for this flexibility is already a topic in the interview for the apprenticeship. Flexibility in general is supported by giving each apprentice a free pass for the public train service. Within the legal limits defined for the age group, apprentices may also dispose more freely over their time and decide when to work.

Co-working spaces and hubs offer employees as much as apprentices the possibility to work in a more informal atmosphere and connect to co-workers or other workers. This may also help in developing new ideas and being creative. The «NEX-Loft» is a new Swisscom invention. It is a working space, which at pre-defined days is exclusively available to learners. Here, they can meet and have an exchange about their current projects as well as create new ideas together. To what extent apprentices can make use of these spaces, depends on their project and their profession, but also their self-organization. ICT apprentices are usually more flexible than apprentices in other professions, such as commercial clerks.

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4.3 Communication

At Swisscom, there is a high level of consciousness about the need to communicate transparently and constructively in order to sustain trust and secure the preconditions for creative work. In regular meetings with their coaches, the learners receive feedback about their behaviour and performance. They are given the opportunity to talk about everything of concern to them and their training. Their exchanges with coaches have been described by many learners as trustful and constructive, especially with respect to making mistakes. In the following example (Author, 2018), a coach reports about an IT (information technology) learner who had been dissatisfied with a tool for events and who expressed his discontent quite strongly. In the conversation with his coach, he was asked what he would improve:

> *«For about two weeks there was radio silence and then he brought two or three proposals as to how to improve the tool. Then we talked about it and we made such good progress that the learner said: 'OK, then. I can build this new tool.' »* (Coach)

The example shows how learners are supported early on in developing critical thinking skills, in acting autonomously, and in shaping products and processes creatively. In addition, the coaches have pointed to communication at eye level, the establishment of a trustful relationship, and the absence of fear in communicating about mistakes as

determining factors for a positive learning culture (see also Schneider & Bresler 2016). According to the testimonies of coaches, this culture of constructively communicating about mistakes contributed to the learners' idea of developing a new tool and feeling confident about his skill to do so. He has first created an ambiguous image of himself by being hypocritical, but with the support of the coach redirected his attention to the problem and its solution. Instead of condemning his behaviour, the coach helped to turn strong concerns into a drive for creative action and supported the development of action competence that led to the development of a new tool. That the telecommunication enterprise actively supports a positive culture of coping with mistakes is underscored in the following quotation:

> *«A mistake is ... . So, we have hung up a poster in the front of the room: 'Making mistakes is better than doing nothing.' Because, for example, instead of only learning something, if I can really do something, test something out. When I make a mistake, then it is about 90 per cent likely that I will never make it again. With this ... you can argue, well, Swisscom says: 'You should rather make a mistake instead of not even trying to make something'.»* (Learner)

At the example of three 21st century or transversal skills it can be seen how these skills are related to each other and are acquired together in a newly structured working and learning environment. Apprentices are growing into modern workplace structures, but can also shape them. The most important foundation for this dynamic or fluid development is that coaches and management are convinced that trusting apprentices to take over lots of responsibility as well as learning best from mistakes and by integrating them in the real work process (although apprentices are mainly 15-19 years old) is key to sustainable learning. This very much follows the general ideas of developing action competence. However, the structures, in which apprentices learn and the trust given to them, boost their personal development.

5. Conclusions

The demand for transversal skills might contribute to changing approaches to apprenticeship training. Although, largely driven by industry needs, they are widely relevant and strongly interconnect. When workplace training in companies, such as the studied telecommunication enterprise, implement a new learning culture, the development of these skills follows conclusively. This entails new flexibilized forms of work in changing teams, at different work places and within a large variety of contexts. Swiss apprentices, in addition, might also change the language and cultural context within their own country. It further requires new forms of accompanying them in their learning process, such as coaching and mentoring. Most importantly is that a high level of trust is given to apprentices, in terms of taking over responsibility but also in terms of learning from mistakes. This is largely accomplished by a communication at eye level. Working mostly in projects and agile forms of work supports autonomous work and the development of initiative-taking behaviour and self-reflection. Overall, the study supports that transfer competences and skills are gaining in importance (Moraal 2009) and that companies need to seek ways in which they can be developed. Since the practices of large enterprises cannot easily be transferred, research needs to support small and medium sized enterprises in finding suitable ways to support 21st century skills development at their premises.

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