

VERONICA BJURULF

4. TRANSFER AS AN ITERATIVE PROCESS BETWEEN SCHOOL AND WORK

The LISA-Project

INTRODUCTION

This chapter explores the nature of transfer between school and work, based on results from a three-year project called the *LISA-project (Learning in Several Arenas)* conducted between 2009-2012. The *LISA-project* focused on teaching and learning at a vocational school and at different workplaces, especially in the Energy Program and the Industry Program at the upper secondary school level in Sweden. The aim of the project was to contribute to knowledge about teaching and learning within and between different arenas, in this case school and workplaces.

Working life is in a state of rapid change, by development of technical equipment and materials that affect working tasks and working conditions. Due to this rapid change, no one can predict the kinds of knowledge professionals within different occupations will need in the future, when new tools, machines, and materials are used, once students enter the labour market. Taking this aspect into account is an important part of the learning environment for students choosing vocational education when vocational education is expected to prepare students for challenging work environments. The students must learn to learn, that includes to be able to transfer knowledge between different situations. This is what Bransford and Schwartz (1999) talk about as preparation for future learning. Previous research shows that students experience problems translating what they learn in school and to make the knowledge useful in complex workplace settings (Caravaglia, 1993; Meijers, 2008; Tanggaard, 2007), which motivates empirical studies about transfer, in order to improve teaching and learning so students are prepared to meet the ever changing future employment demands. The importance of this knowledge can be understood in the light of the need for well-educated engineers, researchers, and technicians, in order to allow Sweden to maintain a strong competitive position as an industrial nation (SOU, 2010, p. 28).

In the autumn of 2008, the Swedish government launched an apprenticeship training pilot, where students spent half their time (about 60 weeks) at a workplace. In the regular education, the students spend 15 weeks at a workplace (Sveriges Riksdag, 2009). The aim was to enhance the students' possibilities to get a basic vocational education, increase job experience and advanced skills in a related career field (Sveriges Riksdag, 2009, section 7). One of the schools that were part of the government's investment in the apprenticeship training pilot was also part of

H.E. Middleton & L.K.J. Baartman (eds.), Transfer, Transitions and Transformations of Learning, 39-48.

© 2013 Sense Publishers. All rights reserved.

BJURULF

the three-year research project called the *LISA*-project (*Learning in Several Arenas*). The *LISA*-project focused on teaching and learning at the vocational school and at different workplaces, especially in the Energy Program and the Industry Program at upper secondary school in Sweden.

The purpose of this chapter is to explore the nature of transfer emerging in interviews with teachers and supervisors in vocational education. Accordingly, the chapter is a contribution to knowledge about how the two arenas, school and workplaces, can interplay to enhance students' possibilities to transfer knowledge between different situations.

PROJECT DESCRIPTION

The upper secondary school in the *LISA*-project was part of the government pilot project, mentioned above, which meant that the students had half their teaching at school and the other half as workplace learning. The *LISA*-project ran from Fall 2009, when the students started their education at upper secondary school, and ended in Spring 2012, when the students graduated.

The theoretical framework of the *LISA*-project is grounded in the phenomenology of the life world (Bengtsson, 2005). According to the phenomenology of the life world we all live in a pluralistic world, the life world, but depending on our positions, perspectives and earlier experiences we conceive phenomena in this world differently (Bengtsson, 2005). From the phenomenology of the life world follows that empirical studies are needed in order to obtain knowledge about teaching and learning at different arenas. Another assumption in the project is that people can convey experiences through narratives (Hydén, 2007). In the *LISA*-project we assumed that the narratives were created jointly by the informants and ourselves as researchers (Chase, 2005). This means that we as researchers did not "catch" or find the narratives or that the informants only should give answers to our questions. Instead, the narratives were created together, on the basis of the research questions and the informants' experiences.

The informants in the *LISA*-project were associated through their involvement in the Energy Program and the Industry Program at upper secondary school. Those programs were in-school programs, and not workplace programs. The supervisors in the project were plumbers and industrial workers at workplaces, who supervised the pupils during their workplace training. One of the teachers at the school had worked as a plumber and the other as an industrial worker, before they retrained as teachers. Even before the *LISA*-project was launched, there was an established cooperation between the teachers and the supervisors in the project, which was an advantage in terms of their participation in the three-year project. In total there were two teachers, four supervisors, three students, and four graduate students involved in the project (see [Figure 1](#)). There were a few more students interviewed for Kilbrink's study (Chapter 7), however, the three students in [Figure 1](#) were involved in the whole project.

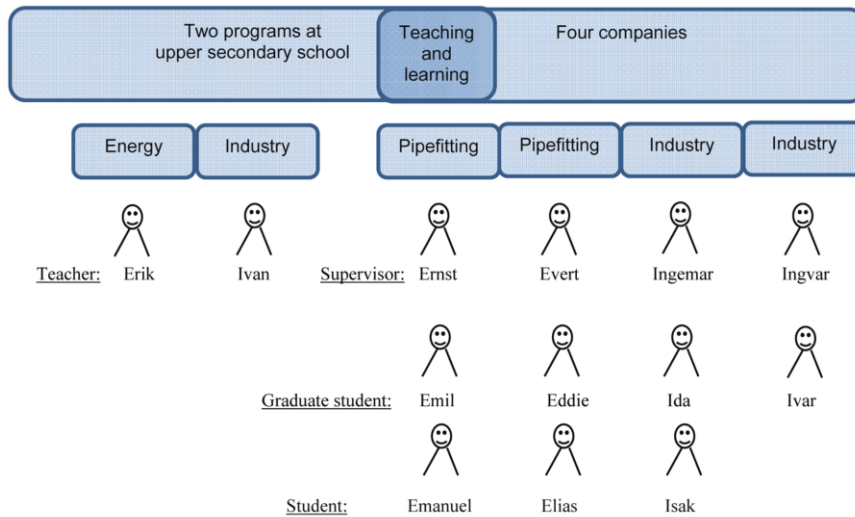


Figure 1. The informants in the LISA-project.

Qualitative methods have been used throughout the project in order to provide a rich and detailed source of narrative data about teaching and learning within the different arenas. We conducted semi-structured interviews, both individually and group interviews. Each of these interviews was audio-taped and transcribed verbatim. The interview method allowed modification of the questions during the interviews and also for exploration of the responses (Cohen, Manion, & Morrison, 2007). Since the narratives were framed by the questions from us as interviewers, we see the narratives that unfolded in the interviews as co-productions in the interview situations (De Fina, 2009). This means that the informants provided details about their experiences, in this project concerning teaching and learning in different arenas, framed by the research questions and framed by the context in which they were told. In this study the informants knew, at some level, what the researchers running the *LISA*-project were interested in and our impression was that they really wanted us to understand what they were telling us about, since they knew that we had no direct, personal experiences from either their education or pipefitting or industrial work. In addition to the interviews, we also observed the teaching at school and at the workplaces and documented the observations by video camera. The observations were necessary to be able to follow closely how the teaching was carried out in order to investigate teaching and learning in the different arenas (Kullberg, 1996). The data was analysed by analysis of narratives and narrative analyses (Polkinghorne, 1995). Polkinghorne (1995) distinguishes between *analysis of narratives* and *narrative analysis* in this way: “analysis of narratives moves from stories to common elements, and narrative analysis moves from elements to stories” (p. 12). We used the concept of narrative for what the

BJURULF

informants told in the interviews and then we merged their narratives into a common narrative in our presentation of the results for publications (see [Table 1](#)).

Table 1. Publications within the LISA-project

<i>Research question</i>	<i>Publication</i>
What factors do influence plumbers and industrial workers to start working within their respective trade?	Bjurulf, V. (2010). Reasons for choosing a technically oriented education: An interview study within the field of pipefitting and industry. <i>International Journal of Technology and Design Education</i> . DOI: 10.1007/s10798-010-9141-5.
What advantages and disadvantages do plumbers and industrial workers experience in their trades?	
What themes of transfer appear in teachers' and supervisors' narratives about technical vocational education?	Kilbrink, N., & Bjurulf, V. (2012). Transfer of knowledge in technical vocational education: A narrative study in Swedish upper secondary school. <i>International Journal of Technology and Design Education</i> . DOI: 10.1007/s10798-012-9201-0.
What factors in the narratives are crucial for providing transfer possibilities in technical vocational education?	
What characterises teaching in school and workplaces, respectively?	Bjurulf, V. (2012). "You'll just have to practice until you find your own way to do it!": A narrative study about how teaching is carried out in Technical Vocational Education. <i>NorDiNa</i> , 12(1), 17-25.
Which identities are emerging in narratives of people who are either entering or are established within pipefitting and industrial work?	Bjurulf, V. (2012). Yrkesidentiteter: Berättelser av personer på väg in i och etablerade inom rörmokeri- och industribranschen. In M. Karlsson & H. Pérez Prieto (Ed.), <i>Livsberättelser – mening och identitet i tid och rum</i> . (s. 21-41). Karlstad: Karlstad University Studies, nr. 2012:8.
What stories about theory and practice are emerging in the informants' narratives?	Kilbrink, N. (2012). Skillnaden mellan de oskiljbara: Berättelser om teori och praktik. I M. Karlsson & H. Pérez Prieto (Ed.), <i>Livsberättelser – mening och identitet i tid och rum</i> . (s. 85-99). Karlstad: Karlstad University Studies, nr. 2012:8.
What differences are made between theory and practice in the narratives?	
How do the concepts of theory and practice relate to each other in the narratives?	
What educational content is important to teach and learn during the vocational education according to teachers' and supervisors' narratives about technical vocational education?	Kilbrink, N., & Bjurulf, V. (submitted). Vocational education and employability: A narrative study on educational content in technical vocational education.
How do students, teachers, and supervisors experience theory and practice in relation to teaching and learning in a technical vocational education?	Kilbrink, N. Chapter 12 in this book.

THE NATURE OF TRANSFER

In a dual school system, where half the students' time is allocated to the workplace and the other half to school, the question of transfer is central. How do the two arenas facilitate students' possibilities to be prepared for a labour market state in rapid change, according to new tools, machines, and materials? Do the students experience the vocational education as a continuum or the teaching at school and at the workplaces as separated parts dealing with different kinds of stuff? With students learning at school and at work there should be transfer in both directions as a strength of the dual arrangement. Those questions underlie the following discussion, based on the results from the *LISA*-project, focusing on the nature of the transfer.

Employability

Concerning the question about how the two arenas facilitate students' possibilities to be prepared for the labour market, previous research shows that there often is a discrepancy between the syllabi and the teachers' actual teaching, since the teachers generally have a background as professional workers and know about the expectations from the workplaces (Baartman & de Bruijn, 2011; Berglund, 2009; Lindberg, 2003). Rather, the *LISA*-project underlines this observation, since there is a clear focus on employability. In order to be employable there are some acquired "foundation stones" to be aware of and fulfil, according to the informants in the *LISA*-project. One of those is to be punctual. Maybe it is more of a consistent demand from both arenas, rather than transfer, but to prepare the students for employment as a plumber or industrial worker the teachers are particular about punctuality. They are also particular about the students wearing appropriate clothes.

An example of the foundation stone of punctuality and evidence that it is also related to implied rules for behaviour is evidenced by "be in time and behave!" – a quotation that characterises the results from an employability perspective. An example from school that illustrates how the teachers are handling punctuality is that they are not waiting for students if they are going somewhere together and the students are not on time. If the students know that they are leaving 7 a.m., "the car is leaving," even if there is someone missing. The informants experience a discrepancy between the syllabi and "real life," since the content in the syllabi does not relate to what they know is important for the students in order to become employable, for example, to be punctual.

Another behavioural norm was the requirement for students to be active and show interest and "help themselves" at the workplaces. There are no employers who are interested in a potential employee who "picks up the cell phone" or who "keeps the hands in the pockets." Rather, the students should ask questions such as "what did you do now?" The emphasis during the vocational education is thus to foster the students to become future workmates who "fit into the group of fellow workers." One of the students expressed this as: "I was placed here [at an industrial

workshop] to get experience in how it is to have a real job.” To have “a real job” includes being one in the team.

The teachers and supervisors in the *LISA*-project agreed about the importance of those “social” skills. That is, they agreed that these were important skills for the students to develop during their education in order to be attractive in the labour market. From that follows that the students recognise the expectations from both arenas and may thereby be able to transfer the skills to additional situations and arenas. The nature of transfer in this respect is to adjust the behaviour in order to fit into a group of people generally, and into a group of plumbers and industrial workers specifically in our project.

Basic Knowledge

When it comes to how the two arenas, school and workplaces, facilitate students’ possibilities to be prepared for an ever-changing labour market, both teachers and supervisors emphasise the importance of “basic knowledge” or “foundation stones.” As stated in the introduction of this chapter we are living in a world where technical equipment and materials are developed continuously and quickly, which may influence technical-oriented education to prepare the students for a challenging work environment. The students must be prepared to handle new situations. In this respect, the concept of transfer is of high importance. According to the informants in the *LISA*-project, there is a need for basic knowledge acquired from school before students participate in workplace training. The basic knowledge is specific for the actual profession, which presupposes communication between teachers and supervisors, so the teaching in school meets the needs at the workplaces. However, the basic knowledge is also more general, which the informants exemplify in terms of their comments about the importance of being skilled in, for example, mathematics, measuring, and three-dimensional thinking as preparation for employment.

When the students have acquired the basic knowledge in school, they need to apply this knowledge at the workplace training. This view of transfer tends to cement the criticised view of transfer as applying knowledge learnt in one situation and using it in another similar situation (Beach, 1999; Bransford & Schwartz, 1999; Lobato, 2003; Marton, 2006). On the other hand are the examples in the narratives where the informants express a different view of transfer as a preparation for future learning and the importance of variation in teaching in order for the students to be prepared for unknown situations (compare Bransford & Schwartz, 1999; Marton & Pang, 2006). Drawing on Marton’s (2006) paper on the importance of discerning differences (as well as similarities) across learning activities as a way of improving transfer, one could suggest that the students need to learn by looking at the batwing and listening at the sound from the welding apparatus in order to be skilled in, for example, welding. Material may differ and also the way you weld, but the senses can be used similarly in different situations.

Beyond basic knowledge acquired from school, the project found that branch-specific content-related basic knowledge is also needed. Therefore, a continuous

and close cooperation between the teachers at the school and the supervisors at the workplaces is of importance in order to make sure that the students are offered an up-to-date education. The close cooperation presupposes communication, a factor that both the teachers and the supervisors in the project emphasised as important. Sufficient communication enables the teaching to take as point of departure from the students' previous experiences and knowledge, that is, what the students have learned in *both* arenas, and build further on these and make use of them in different situations. From this point of view, it is important to emphasise both arenas as learning arenas, offering the students possibilities to build further on previous knowledge. Thus, the results indicate that good communication between learning providers is a factor that promotes transfer. By sufficient cooperation and by taking transfer in consideration the students are offered an education that is branch specific *and* general, since the students will be prepared for an unexpected ever-changing future.

The importance of transfer is expressed by one of the teachers in the *LISA*-project, who says that vocational education per se cannot be specific; it cannot be "an exact education," because then the schools would "need to have all the steering systems in the world at the school, and that is impossible." The education must rather prepare the students for future learning (Bransford & Schwartz, 1999). Due to the continuous development of technical equipment and materials a lot of occupations presuppose continuous learning: "you need to keep yourself updated." One of the supervisors in the *LISA*-project says that it is impossible to learn everything, which is one of the attractive parts within the technical-oriented trades such as pipefitting and industrial work – you will always have new things to learn.

In order to be able to learn new things, our project points to the importance of basic knowledge that can be used and adjusted in new situations. When new machines or materials are introduced, the basic knowledge constitutes the experiences needed in order to discern critical similarities and/or differences between the well-known machines or materials and the new ones (compare Marton, 2006). According to Marton, "transfer effects may increase with time, experience, and differences" (p. 512). The experience-factor is expressed by one of the students in the *LISA*-project, who says that he "learns the basics at school" and during the workplace training experience he just "learns more and more." This indicates that the students experience the vocational education as a continuum, rather than teaching in school and at the workplaces as separated parts.

The nature of transfer that is connected to being prepared for an ever-changing labour market echoes Bransford and Schwartz's (1999) view of transfer as a preparation for future learning. From the *LISA*-project it is obvious that the preparation for future learning presupposes basic knowledge as a starting point and also as the basis for future learning.

Theory and Practice

Unlike previous research the results from the *LISA*-project suggest that students experience vocational education as a continuum and do not experience problems

translating what they learn in school to workplace settings (compare, for example, Caravaglia, 1993; Meijers, 2008; Tanggaard, 2007). Instead, both arenas contribute to the students' development of the professions they have chosen to study for, but it is the individual students who fill the personal "boxes" with the tools that fits themselves in their future professions. In a dual educational system there are possibilities for the students to continuously fill the personal boxes with tools from both arenas, thanks to the fact that teaching occurs in parallel in both school and the workplace. The range of tools from the two arenas may differ in terms of focus on theory and practice. In this project, the informants referred to theory as school-related activities, such as to think and read and also to prepare for workplace training. In a similar way they referred to practice as workplace activities, such as physical work, that is, to use the body and the hands, and to make use of the knowledge learnt in school. Thus, theory is seen as preparation for workplace training, whereas practice is seen as the application of the theory. However, this dichotomised, and criticised, way of dividing theory and practice is nuanced in the informants' narratives. They mean, for example, that theory and practice occurs both in school and at the workplace training. Sometimes the students do have better possibilities to develop some skills of a practical nature in school, since some tasks are time consuming and therefore hard to practice at the workplaces because of financial constraints.

The project also shows that there is a combination of theory and practice in the teaching. Mathematics is, for example, embedded in both pipefitting and industrial work and when the study program is organised with half time workplace training, the students are given the opportunity to see the importance of being skilled in mathematics. When the education is organised with students learning both at school and at workplaces they may realise the meaning of the "theoretical" knowledge taught in school and thereby be motivated to learn. One of the supervisors in the *LISA*-project reports that he sometimes gives the students homework, for example, to make a drawing and figure out the amount of tubes needed for an installation. In this way theory *and* practice are interwoven, as argued by Bjurulf and Kilbrink (2008). The nature of transfer emerging when working with theory and practice is a holistic view of knowledge.

CONCLUDING WORDS

This chapter contributes to empirically based knowledge of the nature of transfer between school and work, and especially the nature of transfer in vocational education. The nature of transfer viewed as a preparation for future learning proposed by Bransford and Schwartz (1999) is supported, but also nuanced regarding the need for basic knowledge as a base for the preparation. It was also found that students were expected to behave in certain ways in order to be considered seriously as potential workmates. The nature of transfer in this respect is to adjust behaviour in order to fit into the norms of the actual group of people. Furthermore, the nature of transfer has emerged as iterative in the sense of theory and practice as interwoven. Since the students must be prepared to handle new

situations, in an ever-changing world and in ever-changing trades, preparation for future learning must be viewed as the goal of vocational education. If students learn to learn they will be able to become skilled professionals where transfer of knowledge is a prerequisite for keeping updated in the actual profession.

REFERENCES

- Baartman, L. K., & de Bruijn, E. (2011). Integrating knowledge, skills and attitudes: Conceptualising learning processes towards vocational competence. *Educational Research Review*, 6(2), 125-134. doi:10.1016/j.edurev.2011.03.001
- Beach, K. (1999). Consequential transitions: A sociocultural expedition beyond transfer in education. *Review of Research in Education*, 24, 101-139.
- Bengtsson, J. (Ed.). (2005). *Med livsvärlden som grund: Bidrag till utvecklandet av en livsvärlds fenomenologisk ansats i pedagogisk forskning* (2nd ed.) Lund: Studentlitteratur.
- Berglund, I. (2009). *Byggarbetsplatsen som skola - eller skolan som byggarbetsplats?* Stockholm: Institutionen för didaktik och pedagogiskt arbete, Stockholms universitet.
- Bjurulf, V., & Kilbrink, N. (2008). The importance of interweaving theoretical and practical tasks in technology education. In H. Middleton & M. Pavlova (Eds.), *Exploring technology education: Solutions to issues in a globalised world* (pp. 27-34) Griffith University.
- Bransford, J. D., & Schwartz, D. L. (1999). Rethinking transfer: A simple proposal with multiple implications. *Review of Research in Education*, 24, 61-100.
- Caravaglia, P. L. (1993). How to ensure transfer of training. *Training and Development*, 47(10), 63-68.
- Chase, S. E. (2005). Narrative inquiry: Multiple lenses, approaches, voices. In N. K. Denzin & Y. S. Lincoln (Eds.), *The Sage handbook of qualitative research* (3rd ed., pp. 651-679). Thousand Oaks, Calif: Sage Publications, Inc.
- Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education* (6th ed.). London: Routledge.
- De Fina, A. (2009). Narratives in interview: The case of accounts. *Narrative Inquiry*, 19(2), 233-258.
- Hydén, L. (2007). *Vad är en berättelse? om narrativt inriktad forskning och forskning om narrativ.* (http://www.hj.se/upload_dir/834a53aeeb333a979c7a18f9a8c7f996.pdf), avläst 20101018.
- Kullberg, B. (1996). *Etnografi i klassrummet*. Lund: Studentlitteratur.
- Lindberg, V. (2003). Vocational knowing and the content in vocational education. *International Journal of Training Research*, 1(2), 40-61.
- Lobato, J. (2003). How design experiments can inform a rethinking of transfer and vice versa. *Educational Researcher*, 32(1), 17-20.
- Marton, F. (2006). Sameness and difference in transfer. *Journal of the Learning Sciences*, 15(4), 499-535.
- Marton, F., & Pang, M. F. (2006). On some necessary conditions of learning. *Journal of the Learning Sciences*, 15(2), 193-220.
- Meijers, F. (2008). Mentoring in Dutch vocational education: An unfulfilled promise. *British Journal of Guidance & Counselling*, 36(3), 237-256.
- Polkinghorne, D. E. (1995). Narrative configuration in qualitative analysis. In J. A. Hatch & R. Wisniewski (Eds.), *Life history and narrative* (pp. 5-23). London: Falmer Press.
- SOU. 2010. *Vändpunkt sverige: Ett ökat intresse för matematik, naturvetenskap, teknik och IKT*. Stockholm: Elanders Sverige AB.
- Sveriges Riksdag. (2009). Förordning (2007:1349) om försöksverksamheten med gymnasial lärlingsutbildning. Retrieved 9 July, 2009, from <http://www.riksdagen.se/webbnav/index.aspx?nid=3911&bet=2007:1349>
- Tanggaard, L. (2007). Learning at trade vocational school and learning at work: Boundary crossing in apprentices' everyday life. *Journal of Education and Work*, 20(5), 453-466.

BJURULF

Veronica Bjurulf
Karlstad University, currently
The Swedish National Agency for Education