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Transfer of learning in Swedish technical vocational education: student experiences in the energy and industry programmes

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ABSTRACT
One of the most important issues in vocational education is the interaction between learning at school and at different workplaces. Students need to transfer what they have learned in and between these different learning arenas. However, little agreement exists among researchers on how to conceptualise and empirically study transfer of learning. This article aims to enhance our understanding of this process in technical vocational education by adding a new perspective on transfer: the phenomenological lifeworld approach. Eleven interviews with students enrolled in the Energy and Industry programmes at a Swedish upper-secondary school were conducted. Three transfer themes emerged from the data: learning for new situations, variation and integration of theory and practice. The student perspective, based on the lifeworld approach shows that the different learning arenas – the school and workplaces – can complement each other. The learning arenas offer different opportunities for learning, and learning in both arenas is necessary in order to prepare for an unknown future, according to the students in this study.

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KEYWORDS
Vocational education; transfer; upper secondary school; students’ experiences; school and workplace learning; technical vocational education

Introduction
In Sweden, vocational educational programmes in upper secondary education are organised as a combination of school-based and workplace-based learning (Skolverket 2012; Kilbrink 2013a; Virolainen and Persson Thunqvist 2017) and students are expected to learn in different arenas during their education. Schaap, Baartman, and de Bruijn (2012) postulate that it is important that students in vocational education have the opportunity to learn in different arenas, and those students actively reflect on differences and similarities between these arenas in...
order to transfer their learning and learn for future situations. Furthermore, learning in vocational education is thought to be different from learning in academic settings (Baartman and de Bruijn 2011). In vocational education, learning addresses concrete occupational tasks and both the educational school setting and workplaces contribute to the students’ gradual development of a vocation. However, previous research has shown that when students enter complex workplace settings, they experience problems in their attempts to transfer their learning and reflect on knowledge and skills developed in school (e.g. Tanggaard 2007). On the other hand, previous research has also shown that different learning arenas in vocational education can complement each other in student learning and offer specific opportunities for learning (cf. Aarkrog 2005; Berner 2010; Jonasson 2014).

Hence, two of the most important issues in vocational education are the interaction between learning at school and in different workplaces and the problems students experience in bridging the gap and transfer their learning between the two learning arenas. To bridge the gap between the two learning arenas, previous research for example emphasises the importance of helping the students to connect learning from different arenas by providing clear communication between the school environment and workplaces (Tynjälä 2009; Kilbrink 2013a). Furthermore, teachers, trainers and learners need to be aware of and reflect on the experience of learning in different arenas, and continuously create possibilities for further student learning in vocational education (Akkerman and Bakker 2012; Sappa, Choy, and Aprea 2016). However, there are few studies addressing these issues from the students’ perspective although it is an important resource for understanding phenomena in education (Bengtsson 2013). Furthermore, there are few studies in the area of technical vocational programmes (Berglund 2009; Kilbrink 2013a). This study aims to address this lack of attention to students’ experiences by focusing on students’ experiences at two upper secondary vocational programmes at a Swedish school; ‘the Energy Programme’ (known in Swedish as Energiprogrammet, for heating and sanitation) and ‘the Industry Programme’ (Industriprogrammet, for industrial work). A theoretical and empirical approach that allows us to put students’ experiences at central stage is the phenomenological lifeworld approach. The lifeworld ontology emphasises the world as lived and experienced. According to this approach, empirical studies with those involved with the studied phenomena are important in order to increase knowledge on the phenomena (Bengtsson 2013). Drawing on the phenomenological lifeworld approach, transfer of learning in this article is conceptualised as a dynamic and multifarious process of interplay between different experiences, serving as a foundation for further experiences in new situations (cf. Bengtsson 2013; Kilbrink 2013a; Kilbrink and Bjurulf 2013).

Below, we will describe transfer in vocational education from a lifeworld perspective. Thereafter, the aim and research questions will be presented, as well as a description of the methodology, including an overview of the Swedish research context and our methodological starting point from the phenomenological lifeworld approach. The results are presented in terms of three main themes with
empirical examples from the data. In the conclusion and discussion, we reflect on the empirical themes and the added value of the lifeworld approach for research on transfer of learning in vocational education.

Transfer in vocational education – a lifeworld approach

The phenomenological lifeworld approach taken in this study has implications for our conceptualisation of transfer. Our approach rests on Heidegger’s theory of being-in-the-world (Heidegger [1927] 2004), which emphasises mutuality between the human and the world, and on Merleau-Ponty’s being-to-the-world (Merleau-Ponty [1962] 2002), which emphasises that knowledge becomes embodied through practical experience and that we experience the world through our bodies. Bengtsson (2013), who is a Swedish proponent of the phenomenological lifeworld notion, writes:

The lifeworld is everything that is possible to experience and do for a particular individual, and the lifeworld consists of different regional worlds in which the individual lives, for instance the family, the working place and recreational activities with friends. (6)

Hence, the lifeworld is multifarious and both individual and social. Schools and vocational workplaces can be seen as regional worlds interacting in the students’ experiences. In the lifeworld approach, there is a focus on the lived and experienced world and although we all live in the same world we experience it differently according to our own perspectives and earlier experiences.

While transfer of learning is fundamental in education, the concept has been problematised in previous research (cf. Tuomi-Gröhn and Engeström 2003; Marton 2006). For example, the narrow definition of transfer as applying knowledge from one situation to another similar situation has been criticised, and more complex interpretations focusing on learning processes have been suggested (e.g. Beach 1999; Bransford and Schwartz 1999; Eraut 2004; Marton 2006; Tuomi-Gröhn and Engeström 2003). Also, new conceptions, such as transition, aiming at how knowledge can be generalised over time (Tuomi-Gröhn and Engeström 2003) or transformation, referring to learning as a complex process in which mental, social and organisational change is involved (Helms Jørgensen 2011; Middleton and Baartman 2013) have been proposed.

Furthermore, alternative approaches to transfer have been suggested, for example, a socio-cultural basis for transfer (Billett 1994), an actor-oriented transfer approach (Lobato 2003) or boundary-crossing as a theoretical basis for transfer (Tuomi-Gröhn and Engeström 2003). Akkerman and Bakker (2012) use the concept of boundary crossing instead of transfer, in order to emphasise an ongoing two-sided interaction between different arenas or occupations, thereby also focusing on the value of dissimilarities instead of solely on similarities between situations. Bransford and Schwartz (1999) highlight a perspective on transfer as a preparation for future learning (PFL). This perspective is about learning as gradually developing in relation to previous experience when new experience is made. Marton (2006) elaborates on Bransford and Schwarz’ perspective on transfer as preparation for
future learning by adding emphasis on the importance of similarities and differences in his view of transfer. Marton argues that not only similarities between tasks and situations, but also differences between them are a prerequisite for transfer when making new experiences.

In line with previous authors, in this study, the concept transfer is used in a broader sense than just focusing on similarities and a one-way transition. This study conceptualises transfer as building further on previous experiences in new situations, where transfer is seen as an ongoing learning process (cf. Bransford and Schwartz 1999; Marton 2006) which is continuously taking place in different learning arenas in vocational education (Kilbrink 2013a). Transfer is enhanced by the variation of the content in teaching and learning (Marton and Tsui 2004) and similarities as well as differences between situations are prerequisites for transfer (Marton 2006). Furthermore, from a lifeworld approach, experiences of all parts of human life contribute to how new situations are experienced (Bengtsson 1993). Therefore, transfer cannot be seen as something only concerning the content of the learning tasks. In this ongoing learning process, other aspects are important as well, such as social and cultural aspects. Hence, transfer is a complex phenomenon on many different levels. Similar to the boundary crossing research (cf. Akkerman and Bakker 2012), experiences from different parts of the world are important for how new situations are experienced. However, in the lifeworld perspective, no boundaries are emphasised and the interacting experiences from different regional worlds cannot be divided into different isolated parts. Furthermore, the transitions between the different regional worlds always include experiences from other regional worlds for the particular individual. The emphasis on the interdependence of life and world (cf. Bengtsson 2013) influences the view of transfer in this study as intertwined and multifarious. Instead of either-or, there is a focus on both-and – body and mind; individual and society; self and other; theory and practice are seen as mutually dependent. Furthermore, the experiences from different learning arenas cannot be isolated, and both social and individual learning is possible. Therefore, transfer does not go in one direction, from one arena to another. Instead there is interplay between the different learning arenas and interpretations of previous experiences can change with new experiences (cf. Bengtsson 1993). This also means that both content and experience of all parts of human life interact and are relevant in relation to transfer (cf. Kilbrink and Bjurulf 2013). Hence, the view of transfer in this study has an emphasis on both-and rather than either-or; it focuses on both individual and social aspects; emphasises similarities and differences between learning tasks and situations; and relates to both learning content and learning processes. Just as many other new perspectives on transfer presented in the overview above, transfer is here seen as a transformative and dynamic process.
Aim and research question

The aim of this article is to enhance our understanding of vocational students’ experiences of transfer when learning in several arenas such as schools and workplaces, specifically in technical vocational programmes. Based on a lifeworld approach, the experiences of those involved with the phenomenon under study are considered an important resource in learning about a phenomenon (cf. Bengtsson 2013). Therefore, this study addresses the question: What are students’ experiences of transfer in the Energy and Industry programmes in Swedish vocational education? The students themselves are not expected to use the concept of transfer. Instead, students were asked to talk about their learning at schools and workplaces in two technical educational programmes in Sweden and how their learning relates to and builds on previous experiences in different learning arenas in vocational education.

Methodology

Since the lifeworld ontology emphasises that we all live in the same world, but, because of previous experiences and our own perspectives, we experience it differently (Bengtsson 2013), we need to ask the students’ themselves about their transfer experience as indicated in the research question above. Hence, the lifeworld approach involves an explorative approach and it follows that empirical research on how these lived experiences of different phenomena are needed (cf. Bengtsson 1993, 2013; van Manen 1997). Another assumption underlying this study is that people can express their experiences through narratives (cf. Polkinghorne 1995). Therefore, one-way of studying lived experiences is through interviews with the people involved in the phenomenon concerned (cf. Bengtsson 2013; Kilbrink 2015). In this article, narratives are seen as a way to access people’s lived experiences and what people find important in their lifeworld and we have conducted in-depth interviews with students (Polkinghorne 1995; Clandinin and Connelly 2000; Kvale and Brinkmann 2009).

Research context

The research was conducted at two technical vocational programmes at an upper secondary school in Sweden, using an apprenticeship model. Virolainen and Persson Thunqvist (2017) compare the Swedish VET system with the VET systems in the other Nordic countries, and emphasise that even if the Nordic countries often are regarded as similar in terms of educational systems, there are differences between the VET systems in these countries. In Sweden there has been a greater focus on school-based learning than in Norway and Denmark, for instance (see also Juul and Helms Jørgensen 2013). However, a reform in 2011 emphasised the vocational orientation at the expense of the academic preparation in the Swedish
upper secondary VET system (Virolainen and Persson Thunqvist 2017). There was also an option for schools to have a 50-week apprenticeship period (half the vocational programme) at the vocational workplace, instead of the regular 15 weeks. This study involves students in the elective 50-week apprenticeship programme offered as a pilot scheme (cf. Kilbrink 2013a). In either case, vocational education in Sweden is a dual system where learning takes place at school and the workplace as part of the programme. The pilot programme aimed at increasing the amount of time students learn at the workplace and was implemented as an elective for vocational programmes in 2011 (Skolverket 2012).

One of the vocational programmes focused on in this study is the ‘the Energy Programme’, where Plumber Trainees are educated and the programme specific education includes heating and sanitation. The vocational workplaces can be both large companies conducting new installations and smaller companies more focused on maintenance. In the other programme, ‘the Industry Programme’, Industrial Workers are educated and the programme specific education includes for example turning and welding. Mostly, the vocational workplaces represent different kinds of industries.

**Participants and data collection**

The narratives in this study were constructed through semi-structured interviews (Kvale and Brinkmann 2009) with students enrolled in the Energy and Industry programmes at a Swedish upper secondary school. These programmes last three years, including both learning at school and workplace learning. To reach students with experiences of transfer in this context, the students were selected in a deliberate selection process (Cohen, Manion, and Morrison 2000; Bengtsson 2013), which in this study means that they were all participants in a research project that studied the above mentioned pilot scheme with apprenticeship in upper secondary vocational education in Sweden (see project description in Bjurlulf 2013). The groups of students in these programmes were small (about five students) and all students who agreed to participate in the project were interviewed. The students in this study all had learning experiences from both school-based education and workplaces. Since the student groups were small and the students spent more time at the vocational workplaces than regular vocational programmes in this trial with apprenticeship, the teachers had rather close contact with the vocational workplaces and the supervisors at the workplaces.

In order to obtain data on transfer of learning in the Energy and the Industry programmes, we conducted interviews centring on the following question areas:

- What and how do students learn in school and workplace-based vocational education?
- What are the roles of the school and workplace in the learning process?
- How do previous knowledge and experiences relate to new learning?
The narrative enquiry used in this study allowed modification of questions to the individual respondents. The students’ narratives were framed by the questions from the interviewer, and influenced by the interpretation made in the interview situation and are therefore seen as a co-production between the interviewer and the respondent (cf. Mishler 1997; Bengtsson 2013). In order to avoid general answers and to focus on the aim of the research questions in the interviews, Bengtsson (2013) suggests that it can be useful to ask for examples. Therefore, the aim was to stimulate the students to talk about concrete experiences, and an interview question could start with ‘could you tell me about when you …’ or ‘could you give an example of when you …’. Then follow-up questions were added depending on what the respondents chose to say in the interviews. Even if the interviewers were experienced as interviewers, and even if we used this strategy on stimulating the students to talk about concrete experiences, the students were often not very keen to explore their narratives further, which made some of the interviews rather short. For example, one student said: ‘I sort of don’t really know what you will get out of talking to me, I am not a person who talks much, just so you know’. Kilbrink (2015) argues that even accounts of student experiences from students who do not feel confident that their stories are of interest are important to study to broaden the knowledge of student experiences. Therefore, those interviews are seen as important building bricks in the students’ collected experience, even though they may be limited in terms of depth and elaboration.

The interviews were conducted by author 1 or author 2 at the vocational school or at the students’ workplace. The interviews were audio-recorded and then transcribed. For this study, eleven individual interviews with ten students were conducted and analysed (Table 1). In order to anonymise the students, they were given fictive names.

One of the interviews with Isak and the interview with Emanuel were conducted at the end of the second year of the three-year-programme. The interviews with Emil and Ida were conducted after they had completed the programmes. All the other students were interviewed in the final term of the Energy or Industry programmes, because they then had rich experience of learning in both school and workplaces. The research ethics defined by the Swedish Research Council were

<table>
<thead>
<tr>
<th>Student</th>
<th>Length of interview (min)</th>
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<tbody>
<tr>
<td>Ebbe</td>
<td>22</td>
</tr>
<tr>
<td>Edvin</td>
<td>22</td>
</tr>
<tr>
<td>Edward</td>
<td>22</td>
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<tr>
<td>Elliot</td>
<td>29</td>
</tr>
<tr>
<td>Emanuel</td>
<td>20</td>
</tr>
<tr>
<td>Emil</td>
<td>57</td>
</tr>
<tr>
<td>Ida</td>
<td>56</td>
</tr>
<tr>
<td>Ibrahim</td>
<td>28</td>
</tr>
<tr>
<td>Isak interview 1</td>
<td>31</td>
</tr>
<tr>
<td>Isak interview 2</td>
<td>45</td>
</tr>
<tr>
<td>Leo</td>
<td>30</td>
</tr>
<tr>
<td>Total</td>
<td>362</td>
</tr>
</tbody>
</table>
conformed to and the respondents gave their written consent to participating in this study (SFS 2003:460, § 16).

**Data analysis**

The interviews were analysed thematically, in order to identify empirical themes (Bengtsson 2013). Both the audio recordings and the transcribed interviews were used in the analysis. The content of the students' narratives was analysed, taking the research question as a starting point. During the analysis, the researchers' definition of transfer as building further on previous experiences in new situations was used since the students were not expected to use the concept of transfer themselves. Therefore, the analysis deals with how transfer appears in the students' narratives, as interpreted by the researchers.

The interpretation of what the informants say starts already in the interview situation and influences the interview. Thereafter, the researchers' interpretations accompany the whole research process. The results present the interpretations of lived experience from a limited number of students and therefore no claim is made that these are the lived experience of all students in vocational education. Moreover, the lived experience is articulated at one moment in a specific setting and might not cover lived experience from all possible angles (e.g. in action, other settings, in interaction with others). The research, however, aims to capture the best possible representation of the students' lived experiences. Following the lifeworld ontology, the results are seen as a co-production where both the informants and the researchers participate (Bengtsson 2013).

During the analysis, the transcripts were read and the recordings were listened to several times. Reading and re-reading are an important part of the analysis process (cf. Leach 2012). In this process, themes with similar content emerged from the data. The themes were not predefined and only concerned the experiences of transfer that were mentioned in the students’ narratives. Hence, there could have been more experiences, which did not emerge in this study. Similarities between the different excerpts were noted and collected in preliminary themes. After the first structuring of the data, we returned to the transcriptions and the audio recordings of the interviews to keep close to the data. Then the themes were presented, discussed and reconsidered in research seminars on narrative research. In the first analysis phases there were more themes presented in detail, but in the last analysis phases, they were categorised into three overarching themes. The themes can overlap, since the thematic analysis focused on similarities, rather than differences between the narratives. Hence, the same experience can relate to more than one theme. Examples from the interviews presented in the result section below were chosen to illustrate the different themes.

In the presentation of results below, the students’ narratives about transfer are interwoven in the description of the themes in order to keep the presentation close to the empirical material and to highlight the respondents’ actual words.
Quotations from the interviews are marked with quotation marks and are the researcher’s own translations from Swedish. In all themes there is also one longer quotation, exemplifying the students’ narratives in relation to the different themes. For communicative reasons, the translations are adjusted to written language, but without changing the content of what the students say in the narratives. Comments or clarifications that we have added to the quotations are in square brackets.

Results

The results describe the three themes of transfer that emerged from the data: *learning for new situations*, *variation*, and *integration of theory and practice*. In this study, the students talk about *learning for new situations*, i.e. they learn from making mistakes, from someone telling or showing, or by reading before doing the task themselves in new situations, thus transferring their learning. Furthermore, the students talk about the importance of *variation* of experience in various learning arenas, such as school, vocational workplaces, at home and in their spare time, for transfer of learning and learning for solving new problems. The students also mentioned a wish to be challenged with a variation of new and demanding tasks, in order to be prepared to meet the challenges of unpredictable tasks in their future working life. Finally, *integration of theory and practice*, involves learning for understanding and not only performing tasks and processes, without any reflection. In their narrative the students emphasised this as necessary for transferring of learning and learning to handle new workplaces and new machines.

Learning for new situations

The first theme concerns *learning for new situations* and under this theme narrative elements referring to how the students thought that they transferred their learning and learned for new situations were gathered. The students mentioned some differences between how they learn at school and how they learn at the vocational workplaces, for instance, Edvin, who pointed to the practical placement as one good thing with his vocational programme:

I’ve been able to be at the vocational workplace a lot and learn how it works in real life. Not only bending pipes in the workshop at school. It’s also good, to practice in the workshop, to drill things so that you learn. You can’t do that so much at the workplace later on.

One-way to use previous practical experiences to solve new problems was to make mistakes and learn from them. Isak, for example, said that a good way to learn is by making mistakes, because the next time ‘you won’t make the same mistakes’. Likewise, Edvin said that ‘you try to remember what you have done before, and apply it to what you are going to do now, and if you need to do something differently’. He also stated that ‘you learn at the same time you use it, you learn
new things the whole time’. On the same note, Isak claimed that it is easier to remember ‘if you make mistakes’ rather than if someone else tells you how to do it. Elliot said that ‘you get better every time you do it’ because ‘you remember how you did it last time and you don’t make the same mistake’.

Transfer as Learning for new situations did not only occur through practising and making mistakes, but also involved how something worked, and then performing it. Edvin said that you can ‘learn how a furnace works and then you can participate in disassembling a furnace and someone like [the teacher] tells you how it works’ and also that you need to be able to read manuals and drawings in order to ‘see where everything should go’. Leo described that he learned about how you ‘weld in different materials’ at ‘the workplace placement’ by ‘someone telling me’ and then he ‘noticed it himself’ when he was performing welding. Leo also described how a teacher taught him how to weld by saying ‘yes, now you put the cross like this, and then you weld from right to left a bit sidelong upwards and then you run upwards and …’ and then Leo tried to do it like this himself and that ‘when he does it, he remembers it’. Seeing pictures, hearing about how to weld, and reading about it, and then trying it yourself, are good he thought because then you know ‘what it should look like when you are welding yourself’.

Ebbe stated that he can connect what he does at school to what he does in the workplace, because ‘it is the same there, bend pipes, learn connections and stuff like that’. The difference is that you have more time to try ‘and get some extra help’ at school. Ebbe also said that the teacher knows about what they do in the workplace practice, ‘because he asks about what we do’ and he is sometimes also ‘out visiting us’ at the workplaces, which makes it possible to connect learning in the two different learning arenas.

In summary, the students described how they build on different experiences when transferring their learning, how they transfer and learn to handle new situations by practising, making mistakes and getting instructions from teachers and workplace supervisors.

**Variation**

A second theme in the narratives concerns the students’ need for variation when learning for transfer and handling unknown future tasks. This theme encompasses narratives that emphasised the need of variation (in tasks, school subjects, machines, learning arenas etc.) to broaden their knowledge and experiences and to be challenged in their learning. Experiences from school, different workplaces, but also from spare time and other situations were highlighted as important for transferring their learning for new situations. It also concerns how the programme can vary depending on which vocational workplace they are at or which supervisor they have at the vocational workplace, and to meet a variation can improve how well they can learn and prepare for the future. For example, Ida told the following:
I had to find a new vocational workplace because, then you learn to, well you make new contacts and you get to a new place with new things. Then it is not the same all the time, but you learn new things. […] you learn more when you stand next to someone, when you are allowed to walk around in the workshop and you just don’t stand by one machine all the time, but you actually walk around to different ones.

According to the narratives, students need a variation of experiences from different arenas in order to be able to transfer their learning and to solve new tasks in new or future contexts. Leo talked about welding and that he would ‘like to try different kinds’, and ‘there are only the same kinds all the time and that is not hard anymore, you would like to try some new stuff’. He was also saying that there is ‘no challenge anymore’ because you can do it ‘in your sleep’. It was clear that Leo wanted to try new things ‘and learn’, because that is fun and it can also ‘be good for the future’. In other words, he would have liked to have more different and more demanding experiences to be able to transfer his learning to future situations.

Similarly, Isak complained that in his class, they learned how to turn on old lathes, due to lack of money for new ones, he guessed. He couldn’t see any use of that knowledge in his workplace placement because ‘it is not at all similar’ to turn on the more modern lathes they had there. The only good thing, according to him, was that ‘there could be old lathes’ in different workplaces ‘and then it would be good to know’. Tools and machines were used in different arenas, but, as they imply, there is no transfer between handling different kinds of tools and machines, as this would require familiarity with similar kinds.

In this theme, there are also examples of how a variation of practical experiences from different learning arenas both in- and outside school, are important for learning for transfer of learning for new situations. Leo has a brother who used to be a welder and ‘had a welder at home, a stick weld’ which means that Leo has come in contact with welding before. ‘When my brother taught me something about welding, then I knew something about how you start and stuff like that’, and recounted how he had been doing it at home, when he started welding at school. Leo also said that he already knew things about different materials, like aluminium from running motocross, which were useful experiences for him to transfer and build on further during the vocational programme. He drew parallels between tasks from non-school arenas and what he learned in school. Similarly, Elliot referred to his experiences working with tools in relation to driving motocross, ‘if you need to screw something away or screw something back on’, for example, and how he has connected these experiences to the vocational programme.

Another variation visible in the narratives is the variation of school subjects and a variation of workplaces for workplace learning. Ibrahim said that a bad thing with this kind of dual education is that ‘you don’t get as much time at school as you would actually need’, that he would have liked to have studied more subjects, ‘in order to have more chances later in life’ and that the ‘disadvantage with all workplace practice is that you only know one workplace, then you cannot go
on working somewhere else, that’s the bad thing’. Hence, variation improves the possibilities for transfer, according to this student.

In short, the second theme concerns narratives about the need of different kinds of variation during the education in order to transfer and learn for new future tasks. The variation relates to both the content of the education (what they learn) and to where different experiences are made (where they learn).

Integration of theory and practice

The third theme that emerged from the data relates to the integration of theory and practice. There are some experiences in the narratives related to how theory and practice (theory relating to knowledge about something and practice relating to knowledge in something, seen as different parts of wholeness, cf. Kilbrink 2013b) need to be integrated in order to reach a deeper understanding and to be able to handle tasks in new situations. Neither theory, nor practical experiences are sufficient on their own, judging by the narratives in this theme. To learn in depth and transfer to new unknown situations both are needed, as Leo pointed out:

[…] it is fine to read about it too … because if you are going to take welding licenses you need to know that pores are not allowed, or things like that or ditches … you can see in a picture what it should look like and well, yes, then you know what it should look like when you are welding yourself.

Isak, for instance, mentioned how they ‘studied a lot of turning and stuff’ in the first school year, but that he has ‘forgotten now, because I don’t have use for it here, rather I have forgotten a lot because I am not always standing at a lathe, so then you forget quickly’. Furthermore, Isak also said, ‘you would need to have school more often so that you get to read more’. This suggests that both practical experiences and reading about things at school are important in order to connect what is done at school with what is done in the workplace, as Isak has ‘forgotten’ what he ‘learned at school’, because he has not been able to practise it.

In the students’ narratives, learning at school is emphasised as necessary for solving problems in the workplace. Emanuel described ‘how to draw the pipes, how you should do it in order to get them at a certain distance from the wall, not just hang it up and where to hang it up or where to firm a part of it. And that I have learned at school, so now I know that I can do it here’ at the workplace. The understanding about something in the narratives is often connected to school and it needs to be transferred to the workplaces. But transfer goes both ways, because the problem or the working task at the workplace can appear before or after studying about the problem at school. Isak said that he needs to be at school to study ‘in order to know it’, because at the workplace ‘drawings might come up sometimes, but you don’t understand what’s on them’.

This theme also concerns the importance of knowing why you should do things in a certain way, and not just perform something at a workplace. Furthermore, the experiences indicate that more theoretical knowledge about something – for
example, why you do what you do, or what happens behind the buttons you press – improves the chance to transfer previous practical knowledge into new situations.

Learning aimed for understanding is important for transfer. Ibrahim claimed that there was no time to teach as they do in school at the workplaces, that he ‘wanted to know what was behind all the buttons. Why this and that. It is not hard to produce, to push a button all the time, but it is, what is behind it, what could you learn more?’ If he knew more he ‘could then go to any working place and do it’ but he also mentioned that ‘it is much easier to learn just one thing and just learn to perform one work at one workplace’. Hence, Ibrahim requests more knowledge about what is happening in the machines and requests a deeper theoretical knowledge about what is behind the buttons, to be able to practically perform something at new workplaces. If he understands the processes behind the task while learning to perform a task, he says that it is easier to transfer this learning to other machines in new situations. In the workplace learning, however, there was no time for understanding the processes behind the working task, and he was expected to manually perform the task – to push the button, which prevented him from gaining the understanding he needed to be able to transfer the learning to new workplaces.

Ibrahim also expressed a need to read more, try different things and ‘learn more theory’ at school in order to get broader knowledge. This is achieved through reading books and ‘being thoughtful’ at school, which cannot be done at the workplace machines because there are ‘big things’ and ‘no toys’, and you ‘do not dare to go in to test yourself, you might destroy something’ and it is better to have learned at school first.

To summarise, this theme shows that the students experience that both theoretical knowledge of something and practical knowledge in doing something are needed to learn and to transfer previous learning into new situations.

**Discussion**

This study aimed to enhance the understanding of transfer of learning in several arenas in the Swedish upper secondary Energy and Industry vocational programmes by studying students’ narratives of lived experiences in vocational education. Drawing on the lifeworld approach, the analysis generated empirical themes (Bengtsson 2013). In the present study, the focus was on the lived experience emerging in students’ narratives at a specific point in time using the interview method. Hence, the results do not claim to be generalisable to all lived experiences in vocational education. Furthermore, the study focused on revealing students’ experiences of transfer of learning defined as using and building further on previous knowledge and experiences. The themes only concern what was articulated in the narratives, which means that there could have been more experiences that did not emerge in this specific study. Another limitation of the study is the
limited amount of qualitative data. In this study, we interviewed all the students in the project who were willing to participate, but to broaden the knowledge of transfer in this area, further research on student experiences is suggested. The participating students also sometimes demonstrated an attitude of doubt towards the importance of their narratives, and were not always willing to elaborate on their answers, which made some of the interviews rather short. In future research, following students over time could be one-way to build their confidence in the process as well as trust regarding the importance of their sayings. However, we argue that lifting the students’ voices nonetheless are of importance and that the experiences of transfer that actually emerged in this study could broaden our previous knowledge of transfer with more empirical examples from the student perspective. The lifeworld perspective offers a possibility to approach experiences of the students actually involved with the studied phenomena.

The three themes of experiences that emerged in this study concerned Learning for new situations, Variation and Integration of theory and practice. The first theme, Learning for new situations, concerned narratives where students told us about how they learned to be prepared for new situations. The students said they learned by copying and repeating what they had been told or what they had done before and by practical experiences and making mistakes. The experiences related to this theme were often in line with the often criticised ‘traditional’ view of transfer, referring to transfer from one situation to another, or about applying what you learn at school in a workplace context (cf. Bransford and Schwartz 1999; Tuomi-Gröhn and Engeström 2003; Helms Jørgensen 2011). However, there were also some experiences where a more dynamic interplay between previous experience and new situations was visible, which could be related to more recent research on transfer focusing on learning processes (cf. Beach 1999; Bransford and Schwartz 1999; Tuomi-Gröhn and Engeström 2003; Eraut 2004; Marton 2006; Helms Jørgensen 2011; Kilbrink 2013a). For example, Leo described different resources, such as seeing pictures, reading, getting instructions and trying by himself in the process of learning to weld. Also Edvin’s expression that ‘you learn new things the whole time’ displays learning as a process where new things are building on previous experience.

The second theme, Variation, concerned how students learn from practical experiences in a variation of situations and learning arenas. In this theme, the students’ experiences related to practical experience of previous tasks, which could be useful for solving new problems. Variation in learning settings and learning situations improves the possibilities to experience similarities and differences between situations (cf. Marton 2006). This was also expressed by the students in this study. The students asked for the opportunity to practise in more than one workplace during their programme in order to broaden their experience. Hence, the variation concerns both the content of the education (what they learn) and in what contexts students experience a variety of situations and tasks (where they learn). As in
Kilbrink and Bjurulf (2013), transfer in this study therefore relates to both content and context (cf. Tuomi-Gröhn and Engeström 2003; Illeris 2009).

In previous research, variation in experience is also mentioned as an important aspect of transfer. Marton and Tsui (2004) mention variety as a prerequisite for learning for new unknown situations in the future. Also, Schaap, Baartman, and de Bruijn (2012) state the importance of meeting different situations and reflecting upon similarities and differences in vocational programmes. In this study, Leo, for example, said how he would have liked to have more varying and challenging experiences during the vocational programme in order to learn for the future, and what he does in the programme ‘is not hard anymore, you would like to try some new stuff’ and Ibrahim said that he would have liked to know more than one workplace, and study more subjects ‘in order to have more chances later in life’. This indicates that students wish to be challenged in their learning and not to be restricted by their choice of study. If they get to see different workplaces during their apprenticeship they are also prepared for a working life that entails various aspects of their profession, compared to only one work placement arena. Furthermore, if they get to study more subjects, they also have the opportunity to change their choice of profession later on, which seems to be desirable according to this student’s narrative.

As with previous studies (cf. Aarkrog 2005; Akkerman and Bakker 2012; Kilbrink and Bjurulf 2013), this study shows that the different learning arenas – school and workplaces – can complement each other and offer different opportunities for learning, also from the students’ perspective. However, in this study there was no obvious boundary to cross in relation to the different learning arenas highlighted in the students’ narratives, as mentioned in previous studies (cf. Tuomi-Gröhn and Engeström 2003; Akkerman and Bakker 2012). Students tell that the teacher at school knows what the students do at the workplaces because they have continuous communication about it, or the teacher comes to visit them. This communication or cooperation between school and workplaces is also mentioned in previous research as a prerequisite for a good working vocational education conducted both at school and at vocational workplaces (Tynjälä 2009; Kilbrink 2013a), where the students can see their education as a whole. Maybe this result also relates to the organisation of the programmes with the increased amount of time for the students at the workplaces and the possibility for the teachers to have close contact with the supervisors at the workplaces.

Furthermore, the student experiences reveal that learning in both arenas is needed in order to learn for an unknown future. However, students did not only talk about the learning arenas in school and workplaces when talking about transfer as building on previous experiences. Experiences in other parts of the students’ lives were also important for how they build on previous knowledge and experiences, in line with the multifarious lifeworld approach (Bengtsson 1993). This could be elaborated on in future research, by more explicitly asking students about their experiences from other parts of their lifeworld. This result also implies that it could
be fruitful to involve the students in the cooperation on creating possibilities for learning in vocational education, to further connect to their experiences from other parts of their regional life-worlds. The importance of learning in other arenas outside school, and its importance for learning in school also emphasise transfer as multi-contextual, rather than dualistic (cf. Tuomi-Gröhn and Engeström 2003; Kilbrink 2013a). In this study, the students recounted experiences of home and spare time activities as they build on in their learning in the vocational education programme. This might also have implications for teaching and learning in vocational education. Since teachers and supervisors seem to have an important role in connecting students’ experiences between different learning arenas within the vocational programme (cf. Kilbrink and Bjurulf 2013), this can indicate that teachers and supervisors could also relate to students’ experiences outside the school in order to facilitate transfer. Kilbrink and Bjurulf’s study also showed that transfer could take place between school and occupational life, according to the teachers’ and supervisors’ experience. In this study of students’ experiences, transfer between leisure time and education was also highlighted. Hence, transfer in school could take place both in relation to what is supposed to happen after school, but also in relation to what has happened before the vocational programme.

The third theme, Integration of theory and practice, concerned experiences which highlighted both theoretical knowledge about something and practical knowledge in something as important in order to be able to reach deep learning and be better prepared to transfer previous knowledge into new situations. The students’ narratives also indicate that learning at school is important for understanding what is done in the workplaces. The experiences also show that transfer can go in both directions – from school to work and from work to school, which is also mentioned in previous studies (e.g. Akkerman and Bakker 2012; Kilbrink and Bjurulf 2013). On the other hand, there were many examples in the data of experiences that related more to a dualistic and criticised view, where one arena – the workplace – is the place where the knowledge learned in the other arena – school – is applied (cf. Helms Jørgensen 2011). The students often referred to school as the arena where you can reach understanding about issues to learn during vocational programmes. Near the end of the programme, there were examples of experiences indicating that the students would have liked to study more time at school. Like Schaap, Baartman, and de Bruijn (2012) have stated, the students sometimes prefer the more formal way of learning that can be arranged at school, rather than in the workplaces. Some experiences outlined in the results show that students value the possibility to make mistakes, to take more time to practise, and to get help from teachers. This is more easily arranged at school than at the workplace where production and cost efficiency are more important aims than student guiding (see also Berner 2010).

There were also experiences relating to the theme integration of theory and practice indicating that students need theoretical knowledge: why you do what you do, in order to better transfer their previous experiences to new unknown problems in
the future. Other studies also state that different kinds of knowledge are needed in order to learn for a future unknown profession (e.g. Kilbrink 2013b; Schaap et al. 2009). A prerequisite for being able to perform a job in a new workplace, with possibly other machines than the students have encountered before, is to aim for understanding the whole and the technology of what they are doing. This relates to Bransford (2000), who states that it is important to aim for understanding and not just remembering in learning. Bakker et al. (2011) also emphasise the importance of understanding the technology behind the machines. Ibrahim mentioned the advantage of understanding what happens behind the buttons on the machines, in order to be better prepared for unknown future situations. Bakker et al. (2011) and Kilbrink and Bjurulf (2013) also found that underlying principles could be more visible for students in old-fashioned machines, rather than in the modern ones, where the technology is more embedded. However, when Isak and Leo talked about using old machines they talked about them as preventing transfer. They did not talk about the old machines as a possibility to understand the underlying principles, but that the old machines were not similar to the modern ones and not helping the students to learn about handling new machines. This indicates that if old machines are used in order to understand what happens behind the buttons, it needs to be highlighted to the students by the teachers. Akkerman and Bakker (2012) also emphasise the importance of reflecting together with the teacher in order to facilitate and broaden learning beyond a specific situation.

Practical experience in the workshop at school are also of great importance, since the students have time to make mistakes there, ask questions and understand the theory behind what they do, which is not always the case at the workplaces, where some of the students complains about doing monotonous tasks (cf. Berner 2010). The risk of letting students perform monotonous tasks at the workplace has also been discussed in previous research (Berglund 2009; Akkerman and Bakker 2012). This could also be related to near and far transfer, where the monotonous task would only generate near transfer, whereas some students in this study aim for far transfer in order to learn how to solve new and more complex problems in the future (cf. Middleton and Stevensson 2011). Altogether, the themes of student experiences on transfer of learning in the Energy and Industry Programmes give us a student perspective of transfer in Swedish technical vocational education. The themes relate to both how the students experience transfer, but also how the possibilities for transfer could be improved – for example, by aiming to understand and encounter a broader range of workplaces and various types of workplace related content during the course of their educational programmes.

**Conclusion**

The lifeworld perspective and its multifarious approach invites a view on transfer as both-and instead of either-or; it focuses on both individual and social aspects; emphasises similarities and differences between learning tasks and situations; and
relates to both learning content and learning processes. Furthermore, transfer is seen as a transformative and dynamic process where learning at school and learning in different workplaces in vocational education becomes mutually dependent. As demonstrated in the empirical results where we can see how the experiences relates to both learning content, form of learning and where the learning is taking place. This means that transfer is a complex process on many levels and this study also provides examples of individual students’ concrete experiences of transfer in the Energy and Industry programmes in Swedish vocational education, conducted as school based and workplace based learning.

The result showed that the experiences students make in their learning processes influence how they learn for new situations. The importance of variation in tasks, arenas and learning situations in order to transfer and learn for an unknown future is emphasised in the students’ interview narratives. Transfer emerges as a multi-contextual and multi-dimensional process, rather than a dualistic one, which is in line with the lifeworld approach. Finally, the students reflect on how an integration of theory and practice in learning can make them prepared for future work. However, the study is based on a limited group of students, who all participated in a pilot programme with apprenticeship in Sweden, and the students voluntarily agreed to participate in the study, which might have influenced the results. Further studies of student experience of transfer are needed in order to get a broader view.

Disclosure statement
No potential conflict of interest was reported by the authors.

References


