



Boundary objects as a starting point for reflective learning in vocational education and training classrooms

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Abstract

This article examines the use of thematic assignments developed by vocational education and training (VET) teachers in Norway that focus on students' work practices. In the Norwegian VET system, students attend two years of upper secondary school, followed by two years of apprenticeship at the workplace. The aim of the article is to point out how their work practice experiences can be brought back into the classroom by using specific boundary objects called 'thematic assignments'. The article examines the following research question: *How does working with boundary objects in the classroom contribute to students' understanding and elaboration of vocational concepts?* The data sources consist of semi-structured observations in the classroom and diaries written by the students during their work placements. This study is based on the idea of boundary crossing, using reflection and writing tasks to support students' elaboration of vocational concepts. The discussion argues that the classroom is an appropriate environment for the elaboration of technical terms, that is, the development of vocational concepts via a specific boundary object. This article also discusses writing diaries as a starting point for students' reflections to support the development of naive vocational concepts into more elaborate ones through experiencing their use in the workplace.

Keywords: boundary crossing, boundary object, reflection on/for action, elaboration of vocational concepts, workplace learning, perspective taking/making



Introduction

A well-known challenge in European vocational education and training (VET) is the integration of school and workplace learning. There seems to be a tension between school-based education and students' practical vocational experiences (Guile & Griffiths, 2001), and the two learning sites often seem to function as separate parts of the students' education (Aakernes, 2018; Eiríksdóttir, 2020; Esmond, 2021; Hiim, 2017; Mårtensson, 2022). Ceelen et al. (2023) emphasise the lack of research on how pedagogical practices can support students' learning from their work experiences. This study helps reduce this research gap. Integrating learning from both places could strengthen the role of the teacher in VET: 'If learners cannot connect what they learn in different settings, it is very likely that what they have learned in educational settings remains inert' (Bakker & Akkerman, 2019, p. 351).

In Norway, the primary model for VET consists of two years of school-based learning by vocational teachers with professional experience, followed by two years of apprenticeship at the workplace. During the first two years of a student's education in Norway, students are taught a subject known as vocational specialisation (YFF). This subject, which offers students experiences in enterprises in the private or public sector, is considered a prerequisite for work choices and later work-life (Utdanningsdirektoratet, 2021b). Hence, school-based and work-based learning should complement each other throughout the student's apprenticeship programme. After attending the VET programme Sales, Service, and Tourism (year 1), followed by Sales and Tourism (year 2), students have the opportunity to become apprentices in trades including sales, service, and tourism. However, students in this programme spend more time in the classroom during the school week than in other vocational programmes (Aakernes et al., 2022). School-based learning in a classroom without practical workshops makes it difficult to provide students with experiences that simulate real work situations (Heggen et al., 2015). Therefore, it is necessary to look for practice-oriented enrichment in the school-based part of students' education from the first year. In 2021, Sales, Service, and Tourism students who entered the programme from lower secondary school without certified knowledge and with ungraded subjects increased from 12 percent to 14 percent (Aakernes et al., 2022). This indicates the need for work-oriented classroom activities, especially as many students are at risk of dropping out of upper secondary school (NOU 2019:23).

Moving between different learning sites is referred to as boundary crossing (Engeström, 1987) and is widely acknowledged within vocational education. In VET, students typically meet in at least two learning sites. This type of education, which combines school and workplace learning, is called dual vocational education, and it is recognised as a training approach throughout Europe (Cedefop, 2022). According to curricula and state guidelines (Utdannings-

direktoratet, 2021c), Norwegian VET students are expected to learn across boundaries because their learning sites are both school and the workplace. Therefore, it is vital to understand the advantages of boundary crossing. This study aims to provide insight into boundary object learning. By exploring the use of thematic assignments developed by VET teachers in collaboration with local enterprises, the study sheds light on the contribution of these thematic assignments to students' understanding of vocational concepts. The term 'boundary object' refers to an artefact that fulfils a bridging function between different sites, such as work and school (Akkerman & Bakker, 2011a). In this study, the boundary object, a written assignment called 'thematic assignment', relates to the vocational concepts students encounter in a Sales, Service, and Tourism programme.

Qualitative data are used to shed light on the application of boundary objects in the classroom context. The research question is as follows: *How does working with boundary objects in the classroom contribute to students' understanding and elaboration of vocational concepts?*

The following section first presents the research background and the thematic assignments, followed by a discussion of the conceptual framework of boundary crossing, experience, and reflection in boundary learning, and the writing of diaries to develop and elaborate vocational concepts.

Background

Norwegian VET is, as mentioned earlier, based on school and workplace learning. Both contexts have formal structures with curricula. However, although there are curricula for workplace learning, these are only a starting point for local curricula developed by the VET teachers. In the school-based part of VET education, the Norwegian VET canon of subjects consists of common core subjects and occupation-specific subjects, including the subject of vocational specialisation. The overall aim of vocational specialisation is to provide students with experiential glimpses into occupations before deciding their educational and professional paths (Utdanningsdirektoratet, 2021c). Vocational specialisation enables students to engage in a work environment to develop social and vocational knowledge and skills (Utdanningsdirektoratet, 2021a). Therefore, vocational specialisation is considered the primary learning environment for VET students during the two first years of school-based education (Utdanningsdirektoratet, 2021c) by providing them with opportunities to experience actual work situations. This is realised through work placements in this subject during the first two years. During the work placement, each student has a contact person at work. This person, referred to as 'supervisor at work', supports and guides the student and provides contact between the workplace and the VET teacher.

Vocational programmes and upper secondary schools have a variety of ways at their disposal to organise the subject of vocational specialisation. Some schools or programmes choose various periods for this subject, for instance, four weeks at a time, and others choose two days per week. There are multiple solutions, due to both local context and VET teachers' didactical choices. In addition, some schools and vocational programmes organise the subject differently in years one and two. Table 1 is a typical example of how schools organise their subjects in the first year of Sales, Service, and Tourism.

Table 1. Timetable for a week the first year of Sales, Service, and Tourism Programme.

Monday	Tuesday	Wednesday Work placement	Thursday	Friday
Mathematics	Occupation Specific	Vocational Specialisation	English	Occupation Specific
Mathematics	Occupation Specific	Vocational Specialisation	English	Occupational Specific
Science	Occupation Specific	Vocational Specialisation	English	Occupational Specific
Science	Occupation Specific	Vocational Specialisation	Social	Mathematics
Physical Education	Occupation Specific	Vocational Specialisation	Occupation Specific	English
Physical Education	Occupation Specific	Vocational Specialisation	Occupation Specific	English
Occupation specific	Occupation Specific	Vocational Specialisation	Occupation Specific	Occupation Specific
Occupation Specific		Vocational Specialisation	Occupation Specific	

The table shows that Wednesday is dedicated to vocational specialisation. On this day, students spend the entire day at their work placements.

The school as a platform for data sources

VET teachers at a local upper secondary school initiated a development project that specifically addressed the subject 'vocational specialisation'. The VET teachers involved in the Sales, Service, and Tourism programme were challenged by the lack of motivation among the students. The teachers assumed students

would be more motivated if work-based learning were more integrated with school-based learning. Two VET teachers applied for funding through the Centre of Vocational Education and Training (University of Agder, 2021) with the intention to develop assignments where students can integrate their learning experiences in both learning sites. The teachers wanted to understand and improve their students' work practice by structuring their didactic work and developing thematic assignments. The teachers collaborated with local enterprises regarding the possible content of the thematic assignments. This was done to ensure the assignments were recognisable and relevant to real work tasks.

The boundary objects: Thematic assignments

A thematic assignment consists of vocational concepts students will encounter at their work placements through vocational specialisation. These tasks are linked to the intended learning outcomes described in the Sales, Service, and Tourism programme's curriculum (Utdanningsdirektoratet, 2022) and the core curriculum (Utdanningsdirektoratet, 2021a).

An example of a thematic assignment with the concept of 'communication' involves the following: The curriculum for the Sales, Service, and Tourism programme states that 'the core element of service and hospitality involves understanding the needs and expectations of customers, guests and partners. It entails adapting communication, service offers, experiences, and services' (Utdanningsdirektoratet, 2022). In line with this, the core curriculum emphasises that 'oral skills involve creating meaning through listening, speaking and conversing with customers'. These two curricula formed the basis for the thematic assignment, where one can find examples from a workplace (see Table 2). VET teachers have developed such thematic assignments with the following concepts: added sales, communication skills, ethics, fire alarms, health and safety, networking, people, place, price, product, punctuality, shopping patterns, and sustainability.

The intention is to use the thematic assignments in three phases, as shown in Figure 1. In school, students are first introduced to a concept (e.g., communication skills) and complete several school-based tasks related to this concept. Afterwards, they receive a thematic assignment asking them to explore routines (e.g., how to communicate in their work placement). During VET teachers' visits to students' work placements, the students and teachers discuss the assignment. The final phase is when the students are back in the classroom.

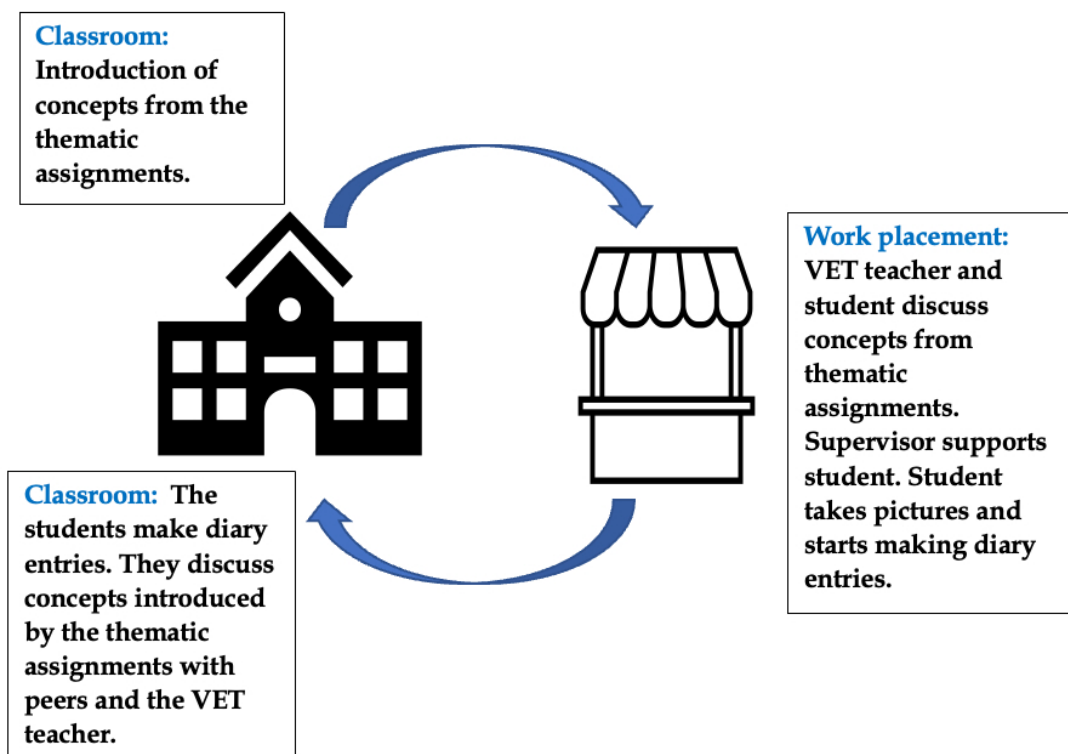


Figure 1. Use of a thematic assignment.

The school's VET teachers have developed a table describing the students' competence development based on the given curriculum (Utdanningsdirektoratet, 2021b). The table was created in collaboration with local enterprises and includes the vocational concepts the students should look for in their work placements.

Table 2 is an example of the first part of one of the thematic assignments VET students encounter. The assignment presents the vocational concept of 'communication' and supporting questions, which are meant to help students complete the thematic assignment, and students can ask their supervisors at work for guidance if needed. Supervisors at work will also have access to these assignments and the opportunity to prepare answers to students' questions and strategies to support the students.

During planned visits to students' work placements, VET teachers and students discuss the vocational concept in the thematic assignment presented above. The teacher encourages the student to discuss and show visible signs (if relevant) or indicators related to the vocational concept. The teacher can then adapt questions to the student's understanding and work context. Students also keep diaries and document the vocational concept with photographs and in

writing. Subsequently, students discuss the vocational concept with their teachers and peers in the classroom (see Figure 1).

Table 2. Example of a thematic assignment.

Thematic Assignment: Communication Skills

- Evaluate yourself based on the criteria in the table below. Where do you place yourself?
- Talk to your contact person in the company, and together, find out where the company believes you are in developing your key competence ‘communication skills.’

Did you and your company have the same perception of your communication skills during your internship? What was different, if anything?

Theme	At the Beginner Stage	In Progress	Competent	Excellent
Communication Skills	You greet customers and colleagues and respond to simple questions. You make eye contact with colleagues, mentors, and supervisors. You call and directly inform your supervisor if you are sick instead of sending a text message...	... and you are a bit more open to dialogue and small talk with customers and colleagues while maintaining eye contact. You proactively approach customers because you understand when they need help...	... and you can conduct and sustain conversations with customers appropriately and satisfyingly. You greet new customers even when you're busy and understand the consequences of poor communication...	... and you communicate with customers based on their needs. You have a good dialogue with colleagues and supervisors and understand the importance of your body language, facial expressions, tone of voice, and pace in communication.

Suggestions for questions you can ask your supervisor during your internship:

- ‘What do you think is important for effective communication here at work?’
- ‘Why is it important to communicate well?’
- ‘What does good communication mean for the company?’
- ‘What can I do to improve my communication skills?’

Boundary crossing in VET education

Boundary crossing in VET education refers to students’ participation in two learning sites and how different boundary objects can contribute to bridging the gaps and enhancing students’ learning (Engeström, 1987). This study applies the

following definition of boundaries: ‘a sociocultural difference leading to discontinuity in action or interaction. Boundaries simultaneously suggest a sameness and continuity in the sense that within discontinuity, two or more sites are relevant to one another in a particular way’ (Akkerman & Bakker, 2011a, p. 133).

Furthermore, boundary crossing refers to ‘efforts to establish or restore continuity in action or interaction across different practices’ (Bakker & Akkerman, 2014, p. 225). For example, VET students encounter differences and similarities between school-based and workplace learning regarding expectations and guidance. By appreciating these differences and acknowledging practices, students can view their own and others’ experiences and practices through new lenses (Akkerman & Bakker, 2011b). The students need support in reconstructing, negotiating, and reflecting upon these differences, their skills and knowledge (Veltman et al., 2024). The classroom could be a context in which to do so.

Boundary objects are intended to contribute to and support students’ learning. The boundary object alternates between the students’ learning contexts. This contributes to continuity and sameness while simultaneously acknowledging the differences between the two learning sites (Akkerman & Bakker, 2011a). The ‘thematic assignment’ in this study aimed to bridge this gap for VET students. According to Star (2010), the boundary object is not self-contained; the object cannot replace communication and collaboration between different parties and contexts. Thus, to ensure collaboration and communication, the VET teachers play a pivotal role in VET. A boundary zone is where different perspectives from the workplace and the school context can be integrated (Tuomi-Gröhn, 2003); thus, it could be either the workplace or school, depending on the support. Riis and Brodersen (2021) discuss the boundary object and the risk of it becoming a ‘tool’, thus only bringing information from one context to another. They emphasise that the potential of the boundary objects needs to be appropriately realised and that the practice of the ‘tool’ and VET teachers’ involvement must be addressed if the tool will take the task to function as a boundary object.

It has been argued that supervisors at work lack the time and commitment needed to support students’ development (Arinaitwe et al., 2022; Löfgren et al., 2022; Mårtensson, 2022). Using a boundary object when planning students’ work placements could address this challenge and thus ensure supervisor commitment to student activities and learning. The supervisors are aware of the students’ tasks at the workplace by having the thematic assignment at hand.

Experience and reflection across boundaries

Integrating experiences across sites can be supported when workplace learning is collaboratively planned and evaluated from both school and workplace

perspectives (Billett, 2010; Billett et al., 2008; Schaap et al., 2012). Although reflection connected to work experiences may add new meaning and increase learning, guidelines and structures are needed (Billett, 2014).

Akkerman and Bakker (2011a) discuss reflection connected to boundary crossing as a vital factor in boundary learning. Knowing what to expect from students' reflection is specified by perspective-taking and perspective-making (Akkerman & Bakker, 2011a, 2011b). These concepts are inspired by Boland and Tenkasi (1995), who stress that cognitive maps and narrative structures help to support perspective-making, thus supporting students in making meaning of their experiences.

Moreover, listening to other students' perspectives, considering other students' experiences from the work placement, and seeing their own experiences through these experiences could be understood as perspective-taking. Students might create new perspectives based on this. This process of perspective-making and perspective-taking can support students elaborating on their previous understanding of vocational concepts.

Dewey (1938) refers to experience as a relationship between operational experience and feelings connected to an activity. Experience from the work placement and reflection on work activities can create more openness to new experiences and learning. These experiences are also linked to thoughts and feelings, not only the activities. Students experience when they are active in a social setting, such as interactions with colleagues, work tasks, problem-solving, and meeting expectations, within the context and values of the workplace. Dewey (1938) also emphasises that experiences that bring new or unfamiliar aspects can be a starting point for reflection and learning. According to Dewey (2005), concepts are built on experiences which include reflection. New situations have the potential to encourage students to question their previous knowledge. For students to learn from their experiences, they would benefit if the process of reflection is appreciated, planned, and supported by teachers. To strengthen their understanding and elaboration of vocational concepts, students must be given the opportunity and support to reflect on their experiences. Reflection-on-action is planned reflection 'away from' the on-hand action and reflecting upon the actions at work and considering what was done, all of which contribute to understanding the steps taken as well as seeing whether they could be developed further (Schön, 1983, 1987), for example, when looking back at experiences at the work placement. Classroom activities could be a context for reflection on previous work experiences and preparation for future workplace experiences (Billett, 2001, 2017). This leads again to boundary-crossing and refers to how teachers can support students' boundary-crossing (Arts & Bronkhorst, 2020; Bronkhorst & Akkerman, 2016; Veltman et al., 2024).

Understanding and developing vocational concepts through writing

Writing diaries (journals or logs) during the work placement has become increasingly common in Norwegian VET programmes. During the first two years of students' education, this approach is applied in the subject of vocational specialisation, where students often attend work placement to get experiences that enhance their learning (Nore, 2015; Nore & Lahn, 2014). E-portfolios are increasingly used, and software applications have often been developed to address this issue. However, as discussed by Enochsson et al. (2022), VET teachers experience several barriers to using specific digital applications that link school and work learning for their students. Therefore, the VET teachers in this study decided not to rely on a specific application or software.

Ortoleva et al. (2016) state that the role of writing in education often has two intentions: students meet expectations about learning to write, and writing enhances learning throughout their learning path. It is known that written coursework can enhance vocational learning outcomes in many areas, for example, by developing ideas and concepts related to vocational experiences (Billett, 2016).

'Writing is a means for reliving and recapturing experience to make sense of it, to learn from it, and to develop new understanding and appreciation' (Wade & Yarbrough, 1996, p. 64). Writing can help students who alternate between school-based and workplace learning, by allowing them to connect experiences and theories from both contexts. However, the VET teacher must be aware of students' competence to ensure that writing is not yet another barrier. Students who struggle with writing or lack the motivation to write need support and active guidance from the teacher (Wrenn & Wrenn, 2009). Such students might benefit from alternative forms of reflection, such as verbal communication or a digital tool, for example, taking pictures. Schwendimann et al. (2015) discuss how journal writing can be beneficial when integrating knowledge from different contexts. Therefore, writing journals can support students in reflecting on their workplace experiences and integrating them into the classroom.

Methodological approach and research design

The aim of the research was to analyse how the thematic assignments contribute to the students' understanding and elaboration of vocational concepts. The following section will present the research design and a description of the data analysis.

Table 3. Design of the field research.

Participants	Data collection	Where are the data collected?	When are the data collected?	Analysis method	Overall methodology
24 students and 2 VET teachers	10 semi-structured observations	In the classroom	Before students' work placement, when introduced to the thematic assignments	Reflexive Thematic analysis	Field research
24 students and VET teachers	10 semi-structured observations	In the classroom	After students' work placement, when working on the thematic assignments		
13 students	25 diaries oriented on thematic assignments from 13 of the 24 students observed	Digital files	After the second classroom observations		

Research design

In this field research, data were collected from semi-structured observations of 24 students and two VET teachers at a local school. In addition, 25 written diaries connected to the students' work placements were gathered. The data collection process followed the boundary learning-circle. This emphasises that the research focus was on teaching and learning at school, that is, what happens in the classroom. Table 3 shows the research design.

Observations of students in the VET Sales, Service, and Tourism programme were conducted when they wrote diary entries connected to the thematic assignments and when the students and VET teacher discussed these further in the classroom collectively. The observations were semi-structured, as a prepared scheme was used to support them (Polit & Beck, 2018). The method was chosen to gain insight into how students worked on their assignments and what they discussed during class. During the observations in class, notes in a prepared scheme were taken, and the observation was intended to capture moods and

body language (Hammersley & Atkinson, 1996; Thomson & Hall, 2016). During these observations, the researcher also had informal talks with the students and teachers. They were encouraged to describe their experiences with the thematic assignments (Walford, 2008). Engaging in informal discussions with the students and teachers led to them sharing their thoughts about the assignments (Hammersley & Atkinson, 1996) and capturing the students' activities in the classroom. The data were originally in Norwegian, and selected quotations are translated into English to illustrate the results.

Researcher's position and reflexivity

This qualitative study strives for insight through reflexive interpretations. Insight was achieved through dialogue with the participants, where different perspectives and practices met, and internally within the researcher (Alvesson & Sköldbberg, 2018; Berger, 2015). The researcher took notes throughout the process to ensure awareness of her thoughts in a dual role as a researcher and a former project leader. 'Reflexivity is commonly viewed as the process of continual internal dialogue and critical self-evaluation of the researcher's positionality, as well as active acknowledgement and explicit recognition that this position may affect the research process and outcome' (Berger, 2015, p. 2). The researcher's role was continuously questioned due to her closeness to the project, particularly in how the researcher can influence the research outcomes (Berger, 2015).

Table 4. Phases of analysis.

1	Familiarising myself with the data from observations and written diaries.
2	NVivo software was used to structure the data. The coding process started with meaning units: what happened during the observations, and what did the students write? Initial codes developed.
3	Codes were sorted into larger groups and themes based on shared meanings derived from the codes.
4	Themes were revised. The data and the coding structure were checked several times to determine whether themes represented the data or whether the analysis was thorough enough.
5	Themes were defined and named, thus ensuring to capture the essence. Three themes were decided on.
6	Writing the article and illustration of analytical work.

Reflexive thematic data analysis of classroom activities

The data were analysed via reflexive thematic analysis. A theoretical, inductive approach was used to identify, analyse, and report different patterns in the data. The research question drove the coding session. Data from the classroom observations and the written content of the students’ diaries were used to identify patterns. The analysis was based on Braun and Clarke’s six phases, shown in Table 4 (Braun & Clarke, 2021, 2022).

Table 5. Examples from the coding process of data from observations and diaries.

Meaning unit Data:	Condensation	Codes	Themes
A student stops writing. The VET teacher asks the student, ‘Why do you think they placed this product by the entrance?’	The VET teacher asks the students questions when they stop writing	The VET teacher adapts the questions, both level and amount, to the individual student	VET teachers’ adaptive guidance Reflection across boundaries
A student says, ‘I find it difficult’ while looking into the air	The student cannot answer question	The student finds it challenging to find examples for the work placement questions. Does not understand the concept	VET teachers’ adaptive guidance
The VET teacher asks, ‘Could the company benefit if the sign were placed elsewhere?’ The student writes: ‘I think this is a good place’	The student writes short answers	Diary as a tool for further reflection	Writing diaries as a starting point for students’ reflection
In the assignment: ‘Give an example of a poster or banner and explain why it’s placed there’. The student writes: ‘See picture above’	The student answers with photographs	Questions exemplified by using photographs	Writing diaries as a starting point for students’ reflection

The phases of analysis resulted in the definition of three themes, and the coding process is shown in Table 5. It was valuable to look beyond the words and actions of the participants (Braun & Clarke, 2021, 2022). By looking more closely at the meaning of the words, namely the context in which they were expressed and in relation to similar quotations, it was possible to understand that the student

found it difficult to link theory to practice and needed more guidance from the VET teacher. An example from Table 5 is when one student said, 'I find it difficult.' If the words had only been analysed semantically, the resulting interpretation would have been that the questions were complicated, that the student lacked the necessary writing skills, or that there was too little time to finish their writing.

Results

The results are structured as three main themes from the analysis related to the research question. The themes are 'Writing diaries as a starting point for students' reflection', 'Reflection across boundaries', and 'VET teachers' adaptive guidance'.

Writing diaries as a starting point for students' reflections

The analysis shows that writing diaries is an opportunity for students to start their process of reflection. The student group in this study was accustomed to writing about their experiences at their work placements. The data show that the students wrote just a few words and exhibited little reflection in their written work. Instead, the students use pictures to exemplify their answers in the thematic assignments.

The following example shows how the reflection process started with a question in the assignment:

'Give an example of a poster or banner and explain why it is placed there.'
The student wrote:
'See picture above.'

The following is another example of a question in the assignment:
'Could the company benefit if the sign were placed elsewhere?'
The student wrote:
'I think this is a good place.'

The written material from the students' diaries consisted mostly of short answers. However, despite the lack of words, the pictures showed that the students understood the questions and identified which images were related to and hereby answered the questions in the assignment. The students' writing alone did not demonstrate or indicate a complete understanding of the vocational concepts they encountered at the workplace. Hence, the students' opportunities to answer questions with pictures also helped them express themselves and expanded the data sources for the researcher's analysis.

The writing process initiated a dialogue between the students and the VET teacher. This classroom activity functioned as a starting point for elaborating on vocational concepts. In one example, a VET teacher stood beside a student

writing in a diary in the classroom. The student looked at the assignment rather blankly. The VET teacher asked, 'I see you have taken a picture outside the shop. What does this picture show?' The student answered the teacher, and they continued discussing the vocational concept. After talking to the teacher, the student seemed encouraged to answer and showed better understanding. Even though the students wrote little, the photos taken at the workplace were used to 're-live' their experiences at work and bring them into the classroom.

Some students did not want VET teachers' support while writing their diaries, and they answered their teacher with few words. This could be understood as a lack of motivation for writing but could also indicate students not understanding the concepts in the thematic assignment. Writing diaries in the classroom can support student learning process by being a starting point for further reflection. However, the writing must be facilitated and supported by VET teachers.

Reflections across boundaries

The data show that planned reflection in the classroom, related to thematic assignments, contributed to the students' understanding of vocational concepts. In the classroom, firstly, the students wrote diary entries connected to the thematic assignments, followed by a discussion on the vocational concept with the teacher and peers. This planned activity was intended to allow students to represent and re-live their experiences at work in a group discussion and relate these experiences to vocational concepts.

In the classroom, the teacher initiated the discussion by asking the students to share their experiences from their work placement related to a specific vocational concept. The teacher encouraged students to participate by referring to their experiences from their work placement, which were often situations the teacher had observed when visiting the student. During this classroom discussion, the students listened to various examples and saw how vocational concepts were understood in different contexts and how tasks are solved differently in other work environments. As well, the students observed differences and other practices, which may help them see their own experiences from a new perspective.

Experiences from work were mediated through their writing of diaries and represented by using their own words in further discussion. For example, in a discussion about the vocational concept of 'place', the teacher asked the students why the grocery shop is by the shopping centre entrance. After some silence, one student answered, 'It's placed near the car park'. Then, several students started answering: 'Because it's inconvenient to take all the food down the stairs', 'Because they use a trolley', and all the students seemed to agree on why the shop should be placed precisely where it is. This can be understood as a 'moment of learning'. When students successfully formed their thoughts about the issue at

hand, it seems they experienced an elaborated understanding of the vocational concept.

The teacher moved on and asked about the placement of a shop at which none of the students had their work placement. This leads to a generalisation of the vocational concept. During this discussion, the students understood the concept discussed and connected the concept of 'place' to their work placements. In addition, many students understood the vocational concept of 'place' connected to other students' placements and unfamiliar work environments. Due to the VET teacher's guidance and support, the classroom discussion seemed to open the students to participation. The students' understanding was more visible during the discussion with the teacher and peers than during the writing process.

VET teachers' adaptive guidance

The VET teachers' role in supporting the students and adapting this support to the individual student was decisive when bringing the students' experiences from the work placement into the classroom. When the students were encouraged to answer questions in the thematic assignments in the classroom, the teacher supported them by asking questions and encouraging them to participate. The questions in the thematic assignments concerned vocational concepts related to the workplace, and the VET teachers supported the students by bringing examples from student workplaces into the discussion.

The vocational concepts in the thematic assignments were met and prepared in the classroom before work placement by ordinary classroom activities, for example, group work and discussion with peers and teacher. This prepared students for further introduction to the concepts during their work placements and could be considered reflection-for-action. Working with the thematic assignment again in the classroom after their work placement supported students in bringing work experiences into the classroom. It was apparent that the VET teacher's role in using the thematic assignment was crucial, both in preparing for the work placement and by facilitating reflection after the placement.

In one of the classroom discussions, the students initially remained entirely silent when the teacher asked questions related to the thematic assignment. Then, after some reflection time, the teacher asked one of the students a more precise question: 'Do you remember that sign outside your shop? The one that shows the deal of the day. What do you think is the purpose of that sign?' The student answered the question. Then, the teacher showed the students example of another sign. Still, the students remained silent. The teacher asked another student a more specific question and got an answer demonstrating an understanding of the concept discussed. Following up, two more students gave examples of the vocational concept from their work placements without being asked. When the teacher supported students by bringing examples from their

work placements back into the classroom in this discussion, they contributed to the students' understanding and elaboration of vocational concepts. When students saw other examples, they were able to see their work placement through them.

The analysis shows that VET teachers used the thematic assignment as a mediating artefact in guiding students individually and collectively. During writing, the teachers adapted their guidance according to the students' level of competence, supporting either the writing itself or student understanding of the thematic assignment. The planned activities in the classroom seemed pivotal in supporting students' development of vocational concepts; however, this depended on how the teacher supported the activity.

Discussion

These findings illustrate how writing can serve as a means of reliving and recapturing experiences to make sense of them, learn from them, and develop new understanding and appreciation, as discussed by Wade and Yarbrough (1996). This re-living of the experience can potentially open the students up to new experiences and contribute to their understanding of concepts. Using photos and the VET teachers' questions fosters further discussion with their teachers and peers. Connecting experiences from their work placement to vocational concepts in the thematic assignments can support their development and understanding of vocational concepts. Schwendimann et al. (2015) discuss how, for example, journal writing can be valuable when connecting knowledge from different contexts, and Billett (2016) stresses that writing can contribute to students' development of ideas and concepts. When students write in diaries, they are supposed to relate their experiences from the work context with the concepts met in the school-based part of their education.

Writing is a tool to support perspective-making in the classroom. This enables students to make meaning of their experiences from the work placement through narratives (Boland & Tenkasi, 1995). Other findings show that writing alone leads to little reflection, but when guided and supported by VET teachers, writing connected to the assignments can serve as a starting point for further reflection. Making narratives through diaries supports students' perspective-making and further perspective-taking through dialogue with others in the classroom. However, analysis of the diaries shows that only a few students demonstrated reflection through perspective-making if not supported by the teachers while writing.

The guidance from the teachers was realised differently: some students received guidance on the writing process, and others were guided to support their understanding of the vocational concept. Ortoleva et al. (2016) discuss two

benefits of writing: Students can learn how to write, and they learn through writing. Some students used only a few words when writing in the diary and showed little interest in receiving support for their writing. One conclusion one can draw is that students might be unmotivated for this writing task or for writing at all. Wrenn and Wrenn (2009) state that writing could be an additional barrier and, hence, could decrease motivation. This must also be considered when students write diaries connected to concepts.

Using thematic assignments in the classroom, both diary writing and having a discussion supported by the VET teacher, was a planned activity after work placements. This opportunity to reflect could be understood as planned reflection-on-action since the students are encouraged to reflect upon their experiences (Schön, 1983, 1987). When students reflect on what they have experienced during their placement, they can increase their understanding.

The findings reveal that students can relate what their peers share to their own experiences. Listening actively and sharing their experiences broaden their comprehension of the discussed concept. Students not only draw examples from their workplace but also discover new instances in unfamiliar settings. This active engagement can be seen as the students demonstrating perspective-making and perspective-taking (Akkerman & Bakker, 2011a; Boland & Tenkasi, 1995). If writing diaries aids in students' perspective-making, it also appears to support individual students in classroom discussions in further perspective-taking. The guidance and support from VET teachers seem to have opened the door for student participation in classroom discussions.

It is worth noting the diversity of learning styles among students. They demonstrate their understanding of vocational concepts in various ways, including through writing (Akkerman & Bakker, 2011a; Boland & Tenkasi, 1995). Even those who use fewer words in their diaries can still be seen as engaging in perspective-making, as their writing serves as a starting point for further discussion. The classroom discussions further highlight the students' diverse learning styles, with some describing their own experiences related to the concepts and others absorbing the experiences of their peers. This diversity enriches the learning environment and fosters a deeper understanding of the concepts.

The results show that planning and facilitating reflection are vital. This coincides with Billett (2001), who states that workplace learning must be planned for by preparing the students for their next work placement, ensuring support in the workplace, and facilitating reflection when they return to school. This could strengthen students' understanding of vocational concepts as well as introduce them to new ones.

When VET teachers support students by bringing examples from the work placements into the classroom, they contribute to students' understanding and

elaboration of vocational concepts through perspective-making and -taking (Boland & Tenkasi, 1995). Since students show different levels of understanding, teachers adapt by using questions and examples from the placements. These students need support in reconstructing, negotiating, and reflecting upon these differences, as well as their skills and knowledge (Veltman et al., 2024). The classroom could be a context in which to do so. This may support students by fulfilling a bridging function and further developing vocational concepts (Akkerman & Bakker, 2011a).

The classroom seems to be a 'boundary zone' since the VET teacher uses thematic assignments as boundary objects. This is by being a context for bridging a gap when using a boundary object as a mediative artefact in the guidance of the students (Tuomi-Gröhn, 2003). According to Star (2010), a boundary object is not self-contained, as it depends on communication and collaboration between different contexts. The results show that the teachers conduct and initiate this communication and collaboration. Hence, the teacher's role is vital if a 'thematic assignment' is to work as a boundary object. Riis and Brodersen (2021) emphasise that a boundary object could become a 'tool' or container. If a thematic assignment only 'transports' information from the workplace into the classroom, students will not benefit from the assignment's potential. By having a VET teacher who facilitates learning by planned reflection and supporting the students, the thematic assignment can restore continuity in the learning (Bakker & Akkerman, 2014).

Conclusion

This study shows that thematic assignments can serve as boundary objects when VET teachers plan and facilitate their use. Consequently, such assignments can be instrumental in students' reflection on vocational concepts and for their understanding and elaboration during classroom activities.

The teachers use thematic assignments before, during, and after their students' work placement and in the classroom with the intention of enabling students to integrate their experiences from both learning sites through teacher guidance (Billett, 2001, 2010; Billett et al., 2008; Schaap et al., 2012). Students' workplace experiences are taken back to the classroom by using the thematic assignments, including diary writing, which works as leverage and is a springboard for classroom discussion. This finally enables them to participate in other students' learning experiences. Through this external perspective, this kind of 'another-mind' experience, their understanding of vocational concepts broadens and deepens.

Reflection through written assignments or diaries has often been neglected or removed from work tasks (Wegener, 2014). However, the results show that VET

teachers facilitate students' reflections on work situations in the workplace prior to reflection in the classroom. This is seen through the discussions and contributes to reflection 'on-action' in the classroom (Schön, 1983) but also 'for-action' to prepare students for new workplace experiences.

By enabling students to see and discuss different perspectives related to their experiences from work placements, the VET teacher's facilitation contributes to students' reflection processes. Therefore, for VET teachers, having organised a plan and developed a method for the use of the boundary object is a prerequisite for boundary crossing (Bakker & Akkerman, 2019; Veltman et al., 2024). Without teacher support and adaptive guidance, the experiences gained during work placements will be left unused and will not contribute to an elaborated understanding of vocational concepts.

Using thematic assignments supports VET teachers and students in finding examples of theoretical vocational concepts from work placements and bringing these concepts into the classroom, though not only functioning as a tool or a container by transporting information from one site to another. The assignments integrate learning from two contexts and are a starting point for further reflection facilitated by teachers. Encountering vocational concepts in different contexts and reflecting on the concepts through perspective-making and perspective-taking could support students' development of vocational concepts (Akkerman & Bakker, 2011a; Boland & Tenkasi, 1995).

The concept of boundary crossing was applied in the analysis to frame a central empirical finding: VET students' connection-making between school and work by using the boundary object 'thematic assignment' needs to be supported by conscious framing from VET teachers. This support contributes to establishing continuity across different practices and facilitates reflection across boundaries (Bakker & Akkerman, 2014). Supporting VET students' reflections at school and the workplace through boundary objects fosters the development of naïve concepts into more elaborate ones.

The Norwegian Completion reform (St.meld. nr. 21 (2020–2021)) aims to help more students complete their education and enter the labour market. Although Norway has one of the lowest NEET rates (young people who are neither in employment nor in education or training) in Europe, early school leaving is still a significant issue (Cedefop, 2024). A focus on boundary-learning could be crucial to breaking the cycle for students who are low achievers (Aakernes et al., 2022), and the findings validate the emergence of new practices that combine the benefits of school-based learning and work placements.

Although this research relates to a Sales, Service, and Tourism programme in Norwegian VET, thematic assignments and their use can be relevant to other vocational programmes, including outside of Norway. This study indicates that school- and work-based learning can be linked pedagogically through classroom

activities using thematic assignments. It is evident that the role of the VET teacher is of great importance in preparing students for work placements and facilitating their sharing of experiences when they return to the classroom, thus supporting their vocational concept understanding and development.

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