

Boundary Objects Supporting Students' Meaning-Making During Work Placement in Norwegian Vocational Education

Monika Øgård, Stefanie Andrea Hillen

Abstract *This study investigates the use of boundary objects in vocational education and training (VET) as an approach to address the challenge of meaning making of VET concepts, often experienced by pupils at school just as 'definitions' to be learnt by heart or to be memorized, hence becoming isolated knowledge instead of contextual applicable and meaningful. A problem that is well known in international dual VET education and research. As well it turns the focus on, for instance pupils, to potentially become co-brokers between the boundary of school and workplace, using boundary objects, reified as thematic assignments in and for both learning sites. In the interplay between boundary objects, advisors, students and teachers, affordances can be created helping to construct meaning and motivation in and for the pupils' VET education.*

Title *Boundary Objects Supporting Students' Meaning-making During Work Placement in Norwegian Vocational Education*

Keywords *Vocational Didactics, Vocational Education, Boundary object, Brokers, Meaning-Making*

1 Introduction

This section introduces firstly two interrelated parts that establish the foundation for this article, both conceptually and contextually. It addresses the concept of meaning-making and its significance in vocational education and training (VET) learning processes. It introduces a theoretical understanding of how individuals create meaning through interaction with their social and physical environment, peers, and vocational tasks. This theo-

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retical grounding is necessary because it frames the study's core interest in understanding how students interpret and are able to make use of vocational knowledge. This leads to the research question: How do students perceive the use of thematic assignments, and how do the thematic assignments contribute to students' meaning-making and understanding of vocational concepts?

As well, the introductory section addresses 'Vocational Specialisation' (YFF) within the Norwegian VET system. Vocational specialisation is a subject offered during the first two years of the 2+2 model in Norway. It is intended to provide students with practical insight into vocational fields through work placements and school-based activities. This contextualisation is important for understanding the study's empirical setting, particularly within the Sales, Service, and Tourism programme, where students often have limited access to workplace experiences. The section emphasises the importance of vocational specialisation in promoting early career exploration, motivation, and retention, particularly for students entering VET with limited prior knowledge or missing skills. The section also outlines systemic challenges, such as the coordination between schools and workplaces, that are relevant to understanding the potential role of thematic assignments as boundary objects.

1.1 Meaning-Making - Its Importance in VET Learning Processes

Individuals can understand and interact in a world when they are able to make meaning of their environment. This includes the challenge of purposefully interacting with the objects and subjects they face. Some of these objects and subjects are met in a more abstract approach, described with and expressed by concepts they must deal with. This happens as well in the context of classroom-based learning in vocational education. The subject vocational specialisation offers VET-students the opportunity to become acquainted and introduced into a vocational field by interacting with, for instance, supervisors, colleagues, peers, and vocational teachers. These interactions serve as valuable sources of vocational knowledge (Fuller & Unwin, 2003; Lave & Wenger, 1991) and facilitate the meaning-making of specific vocational concepts. Through these engagements, students gain a more in-depth understanding of underlying principles and perspectives (Edwards, 2005; Schaap et al., 2009) and develop a common frame of reference. This shared understanding includes both tacit and explicit knowledge, values and beliefs present in the workplace (Bourdieu, 1998).

As students become more involved in their vocational activities, they begin to internalise the norms and perspectives of their chosen field, thus engaging in a process of meaning-making (Aarkrog, 2005; Lave & Wenger, 1991). Increased participation enables individuals to make meaning through their experiences and of the knowledge they acquire. This, in turn, fosters a deeper connection to their vocation and encourages conscious reflection on how their experiences shape their understanding. It also allows them to examine how these factors influence their beliefs and values. Bijlsma et al. (2016) discuss meaning-making as a process in which VET students explore and clarify vocational knowledge in dialogue with others, which enhances their ability to interpret and internalise it. Bruner (1960) similarly emphasises that development is an activity that fosters personal meaning, including both interactions with others and with themselves.

Understanding that VET students frequently shift between classroom and workplace communities, they face varying expectations in each context, leading to a sense of discontinuity in their learning experience. The concept of a “third space” is introduced within third-generation activity theory and explains moments in the classroom where the perspectives of teachers and students intersect (Gutierrez, 1995; Gutiérrez et al., 1999). In these interactions, the separate worlds come together, creating opportunities for new meanings and understandings that surpass the apparent boundaries of each perspective.

This study will address thematic assignments, functioning as boundary objects, and their contribution to students' meaning-making. These assignments were developed by vocational teachers, and continuously refined through feedback and practical use from the supervisors and students. The vocational teachers who created these assignments are independent from the researchers conducting this study. The assignments consist of work-based tasks built on the learning objectives of the programme Sales, Service, and Tourism (Udir, 2020a) and the core curricula (Udir, 2017). Analysing the interviews, particular attention is given to the following research question: How do the students perceive the use of thematic assignments, and how do the thematic assignments contribute to students' meaning-making and understanding of vocational concepts?

1.2 The Subject Vocational Specialisation in the Norwegian VET-System Used for Work Placement

The Norwegian Vocational Education and Training (VET) system is designed to prepare students for future opportunities in both life and work (Udir, 2017). Two years of school-based learning by vocational teachers, followed by two years of apprenticeship, is the general model for VET in Norway. The Norwegian Vocational Education and Training programmes (VET) aim to create pathways to future opportunities in life, including work-life. These are key points stressed by the Norwegian Directorate for Education and Training (Udir). During the first two years of a VET-student's education in Norway, students are taught a subject known as vocational specialisation (YFF). This subject allows students to gain their first experiences in private or public sector enterprises. This is considered a prerequisite for work choices and later work-life (Udir, 2020b). Hence, school-based and work-based learning should complement each other.

As learners move between learning communities, an ongoing coordination between VET teachers and workplace supervisors would be beneficial. Despite this well-known importance of coordination, establishing close collaboration between these parties has proven to be challenging (Dahlback et al., 2018; Nyen & Tønder, 2012; Tynjälä et al., 2022). Research indicates that collaboration between schools and workplaces can provide students with opportunities for better mastery, leading to increased motivation (Helms Jørgensen et al., 2019).

Through the subject vocational specialisation, students can be provided with workshops and work placement opportunities, but these opportunities can vary. Due to limited access to work placements or workshops, Norwegian sales, service, and tourism students often spend more time in the classroom than in other VET programmes (Aakernes et al., 2022). In addition, according to Aakernes et al. (2022, p. 81), 14 % of the 2021 stu-

dents enrolled in this programme started without certified knowledge and with insufficient skills requirements. This indicates an even stronger focus on this student group to keep them motivated and prevent dropout. We assume providing students' the opportunity of meaning-making contributes to their motivation and hence to increase retention.

2 Workplace Learning and Boundary Learning

Hiim (2013) discusses how "experience and language are seen as a process where concepts are developed through participation in practice-based contexts" (p. 313). The benefits of practice-based learning environments are positively acknowledged by Billett (2014), although he stresses that just providing students with a work environment is insufficient.

Students often fail to see the connection between school and work (Aarkrog & Wahlgren, 2022; Gessler, 2017; Schaap et al., 2012). These school-work transitions are seen as a process of boundary-crossing (Tuomi-Gröhn & Engeström, 2003). Through this perspective of boundary learning, the differences between the two learning contexts are potential sources of learning (Akkerman & Bakker, 2011a). An advantage of the boundary-learning metaphor is that it directs attention specifically to the back-and-forth movements joining different situations and learning communities (Akkerman & Bakker, 2011a).

The issue of integrating learning is also examined from an educational design perspective at the boundary of work and school (Wesselink & Zitter, 2017), e.g., learning activities, resources available, and assessment. It stresses the benefit of educational design strategies when supporting the learning potential at the boundary (Bakker & Akkerman, 2019; Johannesen et al., 2022). The educational design perspective is essential in this study. It aims to explore the role of thematic assignments (Table 1) from the students' perspective when they switch between school and work, and how the distinct phases (Figure 1) could contribute to their meaning-making and understanding. Within the paradigms of workplace and boundary learning, the concepts and roles of boundary objects (2.1), brokers (2.2), and affordances (2.3) needs to be explored in detail.

2.1 Boundary Objects

To facilitate boundary crossing, different 'boundary objects' have been considered as a bridge between learning at school and work (Akkerman & Bakker, 2011a; Berner, 2010). In vocational education, a boundary object refers to an object used by teachers, students, and supervisors at work (Akkerman & Bakker, 2012). Boundary objects include physical objects such as tools, equipment, and materials and abstract objects such as concepts, models, and frameworks. Boundary objects derive their significance from the interaction of diverse viewpoints, emphasising the importance of various perspectives converging. These moments of convergence can be considered a 'third space' (Gutiérrez, 1995; Gutiérrez et al., 1999), and the use of boundary objects, like thematic assignments, can facilitate these interactions.

Assigning responsibilities to actors, like supervisors and teachers, in different contexts and using boundary objects to illustrate agreements between them is beneficial (Bakker & Akkerman, 2013; Bouw et al., 2021). In this study, in the different contexts of school and work, the actors are the students, supervisors and teachers. These three actors, each with their unique approaches and responsibilities, can and have to coordinate their activities around a shared object, such as thematic assignments, to support meaning-making across different contexts. Boundary objects are frequently introduced as support in vocational education to facilitate boundary learning. According to Star and Griesemer (1989), boundary objects are defined as follows:

Objects which both inhabit several intersecting worlds and satisfy the informational requirements of each of them. Boundary objects should be adaptable to local needs and the constraints of the parties using them yet strong enough to maintain a common identity across different sites. Hence, they should be loosely organised in general use and become more structured when used on individual sites and adjusted accordingly (p. 393).

Research has shown (Akkerman & Bakker, 2012) that boundary objects can facilitate learning through communication and collaboration in vocational education. However, one needs to emphasise the necessity to systemise this learning to reach the full potential of dual education. Johannesen et al. (2022) investigated vocational teachers' use of thematic assignments to improve boundary learning for students in work placements. Their study found that vocational teachers can use these boundary objects to re-connect work-based learning from the workplace to school-based learning, and that systematic development of vocational didactics is possible. Riis and Brodersen (2021) also underscore the potential of such boundary objects, hence, the necessity for dialogue and scaffolding when students cross boundaries.

Boundary objects are meant to be supportive tools, but they can also be hindrances. On the one hand, the study by Stoffels et al. (2022) indicates that interaction with other peers and supervisors can contribute to the student's development and reflection. On the other hand, they say a portfolio may establish an additional barrier to overcome; "Thus, the use of boundary objects may become a goal in itself that takes energy away from 'true' learning, suggesting a deconstructive struggle" (Stoffels et al., 2022, p. 1435). An example is if students struggle with writing and experiencing working on the thematic assignments as an additional burden. In this context, the diary can serve as a boundary object that initiates reflection and reduces the emphasis on writing, thus alleviating the burden (Øgård, 2024).

In this study, thematic assignments are chosen to support students moving between different learning communities, thus supporting students' learning. In the thematic assignments, the students are encouraged to ask questions to their supervisor or colleagues during work placement. Ferm et al. (2018) found that students used questions to expand their vocational knowledge and seemed engaged in their vocations, but the downside was that the students were afraid of appearing incompetent by asking questions. Hence, this student's engagement alone was insufficient during a work placement; students would

have needed more support and improved structured learning chances (Evans et al., 2010; Ferm et al., 2018; Fuller & Unwin, 2003).

2.2 Brokers

Brokers are described as individuals who move between contexts, such as school and work (Tuomi-Gröhn et al., 2003), facilitating boundary crossing. Brokers connect learning communities, coordinate activities, and introduce new opportunities for understanding. Brokers act as mediators, meeting various expectations and facing different ways of solving tasks (Akkerman & Bakker, 2011b). Vocational teachers bridge the gap between workplace and school, using boundary objects to support this role. Brokers introduce elements from one practice into another and participate in both. Vocational teachers and students, equipped with the boundary object, can act as brokers during work placement, and may “(...) face a difficult position because they are easily seen as being at the periphery, with the risk of never fully belonging to or being acknowledged as a participant in any one practice”. (Akkerman & Bakker, 2011a, p. 140).

As mentioned, boundary objects act as a bridge between different groups, facilitating collaboration despite varying perspectives or expertise (Riis et al., 2019). However, it is vital to know the limitations of each boundary object and to acknowledge the role of, e.g. the teacher (Riis & Brodersen, 2021). Wenger (1998) explains that boundary objects are essential in bringing together different perspectives and contributing to meaning-making (p. 108). In this study, the students interacted with teachers, supervisors and peers, who all contributed with different perspectives.

Brokers are involved in different aspects of the workplace and act as translators (Tuomi-Gröhn et al., 2003). By taking the role of a broker, the vocational teacher supports students' learning related to their work placement: “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).

2.3 Affordances

Affordance is a concept borrowed and designed from psychology (Gibson, 1977), referring to potential qualities or features that suggest its possible uses or users and how it can be interacted with. Hence, the concept of affordance is also relevant to boundary learning and the role of brokers, as it refers to the potential actions or uses that the boundary object facilitates across different social worlds or communities. Olesen (2016) describes affordance in detail:

Affordances are not properties of an object or of an agent; they are both. They are neither primarily physical nor primarily phenomenological. Affordances arise in the interactive relationship between an agent and an object or its environment. They must be perceived by an agent. When we look at objects, we see their affordances, not their (objective) qualities (p. 38).

Affordance becomes apparent through an individual's interaction with an object or its environment, and Shien and Billett (2024) discuss the importance of identifying the affordances to be able to adjust them over time. When considering affordances in the context of boundary objects like thematic assignments, the affordances of these thematic assignments can be shaped by the practices and needs of the different groups interacting with them. Related to the use of the thematic assignments, the teachers' practice differs from the students. The practice also varies among different teachers. Boundary objects' affordances are not static; they evolve based on the interactions and practices of the communities that use them, hence, the brokers. An example of this could be how the vocational teacher decides to use the thematic assignments as a starting point for reflection at the workplace (Øgård et al., 2025), while maybe another teacher decides to discuss the students' work in general. How the teachers see an affordance of the boundary object, like a thematic assignment, affects how they work with the assignment and the students. Thus, one teacher may better support students' meaning-making of vocational concepts than others.

3 Methodological Approach

This section comprises the setting, design and data analysis of the study on the students' perceptions of thematic assignments. In detail, it will explain the context of the study, the development and structure of the thematic assignments, their use and place in the overall research design. The related content analysis of the interviews, teacher focus group, and individual interviews with students will be presented. Finally, exemplified datasets will show how the coding process led to the results discussed and presented later in the findings.

3.1 The Context and Thematic Assignments

Vocational teachers in an upper secondary school's Sales, Service and Tourism programme initiated a development project on 'vocational specialisation' supported by the funding through the Centre of Vocational Education and Training (University of Agder, 2021). The purpose was to increase student understanding and motivation through the subject of vocational specialisation. Their focus was on the integration of students' experiences from the two learning communities, school and work, through a structured use of thematic assignments.

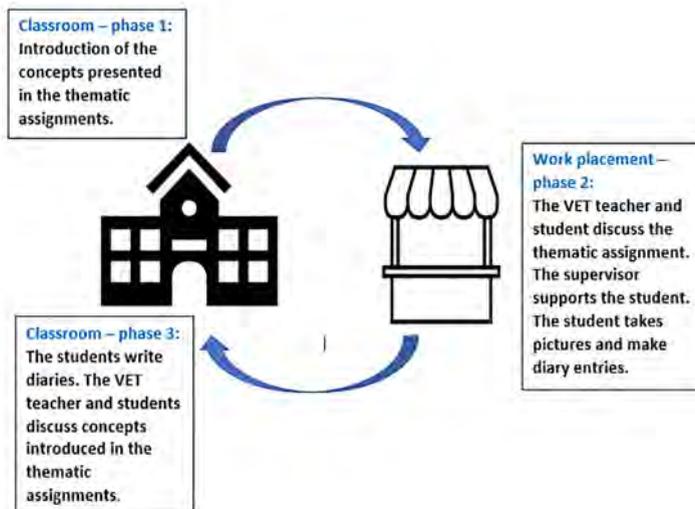
The thematic assignments consisted of vocational concepts from work life, for instance, In-store sales environment (Table 1), that the students face during their work placement through the subject of *vocational specialisation*, as well they were given through the school's subject's curriculum described as learning outcomes in the Sales, Service, and Tourism programme's and the core curriculum (Udir, 2017, 2020a)

Table 1: Example of a Thematic Assignment

Thematic assignment year 2: In-store sales environment In-store sales environment influences customers' purchasing behaviours. Describe the in-store sales environment at your workplace and provide examples				
Theme	Novice	Advanced Beginner	Competent	Proficient
In-store sales environment	Takes pictures that show examples of the in-store sales environment and has explanatory text with the pictures and explains with examples and pictures how "space" and "influence" together create the in-store sales environment and explains why the in-store sales environment is important for the business with suggestions for improvements
Suggestions for questions students can ask the contact person at work: · "This week's task is about the in-store sales environment. What do you think is important here in this store?" · "Do you have time to show me some of the things you think are important for the in-store sales environment?" · "Why is the in-store sales environment important?" · "Can you show me a sign or poster that is placed somewhere intentionally?" · "What is the company trying to achieve by having it here?" · "Could it have been placed somewhere else?" · "How do you think the in-store sales environment can affect sales?"				

The vocational teachers established a three-phase plan for utilising thematic assignments (Figure 1). Firstly (phase 1), students were introduced to the concepts before their work placement. Secondly, during the placement (phase 2), the concepts were discussed through dialogue. In the third phase, the concepts were reviewed back at school (phase 3).

Figure 1: Three phases of the Use of Thematic Assignment



Note. From “Boundary objects as a starting point for reflective learning in vocational education and training classrooms,” by M. Øgård, 2024, *Nordic Journal of Vocational Education and Training*, 14(4), p. 49. Copyright 2024 by M. Øgård.

3.2 Data Sources

To obtain an overarching and complementary understanding, data were collected through a combination of interviews, teacher focus group, and individual interviews with students. These methods provided diverse perspectives and allowed for triangulation of findings. The combination of group and individual interviews ensured that both collective-reflective insights and individual experiences were captured in the study.

3.2.1 Teacher Focus Group

Two vocational teachers, who designed and developed 32 thematic assignments, were invited to participate in a semi-structured focus group (FG) which took place at their school. The FG aimed to examine the vocational teachers' thoughts and allow them to reflect through interaction with each other (Wilkinson, 2015), to supplement the data from the personal interviews with the students. FG was chosen to enable the two teachers to listen, discuss, and comment on each other's responses to improve the quality of the data (Patton, 2002). To stimulate a discussion (Wilkinson, 2015), the FG was based on one of the thematic assignments both teachers had used in their classes (see Table 1).

While the study primarily analyses students' meaning-making, the teachers are also asked about their intentions with the thematic assignments to understand how they supported students' intended meaning-making. The teachers were asked to explain the structure and content of the thematic assignments, their goals, and their experiences

using them. The FG lasted approximately 75 minutes and was recorded and transcribed before conducting student interviews.

3.2.2 Student Interviews

Following the teacher focus group, 19 semi-structured individual student interviews were carried out (Table 2). In advance, all first- and second-year students were informed about the study and were asked by their vocational teacher if they wanted to participate. Four out of 24 students in year one agreed to participate, and 15 out of 18 students in year two. Of this group, eight preferred to participate in pairs, while seven chose to participate individually.

Table 2: Overview Interview with students

Number of students	Year in VET	Individual/or in pairs
4	First-year students (11 th grade)	Individual
8	Second-year students (12 th grade)	In pairs
7	Second-year students (12 th grade)	Individual

During the interviews at school, the students were first shown a familiar thematic assignment (see Table 1). Then they were interviewed applying a semi-structured interview guide. It was the same thematic assignment that the teachers were asked about in the focus group. The interview guide comprised some but not too many keywords such as ‘the use’, ‘work placement’, ‘at school’, ‘vocational teacher’, ‘supervisor’, and ‘understanding of concepts’. The aim was not to miss important information by using a fully structured interview guide (Dalland, 2020). Through these individual interviews, the students were able to convey their perception of the use of thematic assignments in their own words and descriptions (Kvale & Brinkmann, 2015). The individual interviews lasted approximately 10–15 minutes, were recorded and transcribed right after all the interviews took place. To ensure the participants felt comfortable, the interviews were conducted face-to-face at the students’ own schools. Ethical guidelines for research were followed, and the project was reported to SIKT – the Norwegian agency for shared services in education and research (2025).

3.3 Analysis of Data – Directed Content Analysis

This research applies a directed, qualitative content analysis (Assarroudi et al., 2018; Hsieh & Shannon, 2005), which uses already well-known and developed theories to be able to prepare, organize, and to report findings related to a particular phenomenon (Hsieh & Shannon, 2005; Polit & Beck, 2018). The analysis was guided by Star and Griesemer’s definition of a boundary object (Star & Griesemer, 1989). In addition, Akkerman and Bakker’s (2011a) theoretical framework of boundary learning was used.

Acknowledging vocational teachers' intention to use thematic assignments to enhance student understanding, it was a coherent necessity to analyse the contributions of the thematic assignments to students' learning. The analysis process is divided into two consecutive parts A and B. First, the analysis aimed to figure out (A) how and whether the thematic assignments can function as a boundary object (Table 3). The FG interview provided specific insight into the development and the use of the thematic assignments. Their following analysis provided an overview of the variety of intentions and experiences by the teachers. Secondly, MAXQDA (VERBI software, 2022) was used to analyse the individual interview data, and the definition of a boundary object first led the coding. The key-elements of boundary objects, seen in Table 3, are based on Star and Griesemer (1989) definition, and the research by Akkerman and Bakker (2011a).

Table 3: Analysis (A): Data coding on boundary objects

Vocational teacher	Student	Key-elements of Boundary Objects
"We wanted to combine the two learning contexts" "It is a way of finding practical examples of theory" "It is the dialogue; we find out the tasks together with common goals"	"It is, in a way, a merging of all subjects"	Various perspectives merging
"It is a way of systemising it all" "We walk around in the shop, looking for visible signs"	"When we discussed 'customer service' with a peer who is placed in a similar type of workplace, it was surprising to learn that they have different approaches"	Standardised form: can be used by different groups, yet adaptable and flexible

Vocational teacher	Student	Key-elements of Boundary Objects
<p>“Discussing the thematic assignments with the supervisor fosters a learning dialogue”</p>	<p>“When we discussed ‘customer service’ with a peer who is placed in a similar type of workplace, it was surprising to learn that they have different approaches”</p>	<p>Meeting and addressing of similar or different perspectives</p>
<p>“The thematic assignments set an agenda for my visit to the workplace, both with the student and the supervisor”</p>	<p>“I discuss the assignment with the teacher and the supervisor” “The teacher and my supervisor discuss the theme with me when I am at work, and they help me find good answers”</p>	
<p>“Through the diaries, photographs and dialogue, I get a good understanding of their level and development”</p>	<p>“By using the assignment to evaluate myself, I can set goals for further development” “When I discuss the assignment with my teacher, they know how much I understand and the level of support”</p>	

The deductive content analysis of thematic assignments applied as boundary objects showed that if teachers and supervisors support and facilitate them, they can function as boundary objects. This result is based on the student interviews, where they discussed the different aspects of the thematic assignment. As presented in Table 3, the vocational teachers also confirmed this as intended and experienced when using the thematic assignments. After the first analysis of the key-elements (Table 3), further analysis (part B) was conducted regarding the main research question, which was to explore how the students perceive using thematic assignments. The deductive content analysis was based on research into boundary-learning presented above. During this analysis, meaningful units were identified (see example in Table 4).

Table 4: Analysis (B): Perception of the thematic assignments (examples)

Meaningful units	Condensations	Codes	Categories
"It gives us teachers better insight into the students' work placement and tasks" (teacher)	The teachers see the students' work	Insight into another world	The brokers matter
"It is easier to see the connection between work and school when exploring the questions" (student)	Students explore the relationship between theory and practice	Connecting and seeing the relationship between school and work	Overcoming differences
"We discuss the concepts in class, and listening to each other's experiences is so interesting! We compare. It is like we connect it all" student	Reflection makes the students to connect own and other's experiences		Making the connection
"The assignments make me think more, and work seems more meaningful" (student)	The students experience their work more meaningful	Meaning-making	Making the connection

3.4 Data Sources, Choices Made and Limitations

From the beginning of the study, we carefully considered the data collection methods and potential sources, ultimately deciding to rely on students, and on how and where they were willing to share their experiences. We focused on situations where they could demonstrate and explain their workplace tasks. They showed signs of proudness to show themselves in their working environment. Anticipating limited handwritten feedback in their diaries, we encouraged students to also capture photographs. This was based on our own experience as vocational educators and the collaboration with the VET teachers. While this method limited the data we had at our disposal, it represented a compromise between gaining actual insight and ensuring students felt less disturbed, thereby fostering openness and engagement in participating and sharing their ideas.

In qualitative research, the emphasis is placed on transferability rather than generalisability (Lincoln & Guba, 1985). Transferability refers to the extent to which the findings can be applicable in other contexts or with different groups. As such, it is not the responsibility of the researcher to claim generalisability, but rather to provide sufficient contextual detail so that readers can determine whether the findings are transferable to their own settings. In line with this, we have included a detailed description of the participants and the context in which the study was conducted, as recommended by Polit and

Beck (2022). This allows for a more informed assessment of the study's relevance beyond its original setting.

4 Findings

This section addresses the students' perception using thematic assignments related to the subject of vocational specialisation.

The analysis in Table 3 shows how the thematic assignments worked as boundary objects when students moved back and forth between school and work. Table 4 contains an example of the analysis. Based on these processes of analysis, three main themes were identified. These capture the essence of the data material related to the research question, condensed as: "Overcoming differences", "Making the connection", and "The brokers matter".

4.1 Overcoming Differences

The thematic assignments required students to identify various aspects of their work and to become acquainted to their workplace. Students and vocational teachers described how the concepts of the thematic assignments were introduced at school. They also described how the students were guided to explore these concepts in the workplace to expand their understanding, with the support of the questions, the supervisor, and the VET teacher. A student said, "The learning is quite similar, but also quite different. I can see more sides of the [same] concept discussed before." Another student expressed, "I am becoming increasingly curious about my workplace, and the questions help me to explore, and it is also an excuse to ask questions". This coincides with the teacher's statement about the purpose of the thematic assignments: "to explore and find out more about their workplace and tasks". This allowed students to elaborate on their existing understanding of the concept. It was also evident that the students valued the questions in the thematic assignments as support when 'interrupting' their supervisor or colleagues.

The findings also showed that the diary notes were not sufficient to provide the teacher and supervisor with insights into the students' work; hence, many students mentioned that they did not consistently maintain entries in the diary. Nevertheless, teachers stated that the thematic assignments contributed to coordinate their work. "It gives us a better insight into the students' work placement and tasks," one of the teachers claimed. A student expressed a similar meaning within the same theme: "When the teacher comes to work, they help me to see the different ways of communicating. Help me understand what they expect at my work." Both the teacher and the student seemed to recognize the benefit of this coordination and how this insight contributed to the students' understanding. The three phases (see Figure 1) seemed to be part of this coordination: a planned time, place, and agenda in which the teachers collaborated with the supervisors and students. Teachers gained insight into the students' understanding of the concepts in the thematic assignments, their work tasks, and their development, which helped them to learn how to better support their learning better and help them to overcome the differences between learning communities.

4.2 Making Connections

The questions in the thematic assignments supported the students to identify different aspects of their work placement and to connect the two contexts: "It is easier to see the connection between work and school when you explore the questions." The questions helped the students to link learning from the different learning environments. The teachers explained how "the idea is to make the students to connect everything". In addition, it appears that the vocational teachers identified different aspects of the workplace, which enabled them to make and add meaning and to support the students. Both by supporting the students when they saw them during their work placement and by having enough insight to discuss different aspects of the concept in the classroom.

During the FG, the vocational teachers discussed the important role of the teacher and supervisor to identify different aspects of the workplace to support the students in reflecting on their experiences. Several students discussed that they found it inspiring to learn about their peers' experiences on work placement: "I thought they solved it similarly in every store, but they do it differently even within the same chain." This student appreciated the sharing of experiences, which gave her an additional, alternative, and viable perspective on the concept by discussing her and other students' experiences.

The students' increased understanding became evident as they discussed the different concepts. "There were so many tasks that I used to think were unnecessary. Now I can see why we do them; it makes more sense." This student explained how the questions in the thematic assignments made her explore more in the shop and ask more questions, and in consequence that she could make meaning out of it. She linked theory to work tasks, which motivated her to complete the former perceived meaningless, 'boring' tasks at work. The student's understanding of work changed and contributed to the change in attitude.

In addition, the students were encouraged to make diary entries by uploading photographs and answering questions based on their work placement experiences. The teacher discussed how they did the walk around to support individual reflection on the concepts in the classroom. The intention was for students to see how their experiences related to their school-based learning. The students' responses varied; some appreciated working with the diaries, and others tried to avoid it.

4.3 The Broker Matters

When the thematic assignments involved the students exploring different aspects of the concepts, it was evident that this helped them and gave them a reason to ask the supervisor at work. Still, one of the students said, "I do not see the point of these thematic assignments (...) I just want to work. My teacher understands that, so I do not do much work on the thematic assignments—at least not the writing part. But I do take photographs for my diary". In this situation, the thematic assignments seemed to be a barrier to overcome rather than support, leading to frustration. Despite this, the teacher did mention how she solved this:

If the students are demotivated to work on the thematic assignments, we discuss the concepts mentioned there, without focusing on them 'solving an assignment'. We try to support and motivate them and give them a chance to show us how much they understand. Instead of asking them to write a lot, we encourage them to take photographs to illustrate.

Both teachers discussed their role in dealing with disengaged students and that meetings between the vocational teachers and students in the workplace were even more important to address them.

The VET teachers mentioned how their intentions in developing the thematic assignments were to 'train' the students in reflection and to support their reflection at work and at school, and therefore to discuss the concepts further in class (see figure 1). These three phases in the pedagogical design showed how the vocational teacher planned and prioritised time for these reflections. One of the students claimed, "It was better last year when we discussed the concept in the class. Not all teachers do that." A few students mentioned this during the interviews, and one of the vocational teachers said similarly, "It all depends on how the different teachers solve it; we only suggest how to use the thematic assignments". The findings illustrate how the affordances of thematic assignments are shaped by the individual teachers' interactions with them. The thematic assignments are not self-propelled; activating students' reflection depends on the teachers taking the opportunity to facilitate learning experiences in the classroom.

Students were also varied in their discussion of the supervisor's support of their work on the assignments. Some supervisors 'walked the talk' with the students, discussing the concepts, showing interest in the thematic assignments, supporting both the writing and finding good examples. Unfortunately, some supervisors left all the responsibility to the students. Despite this variety, other supervisors have adapted the support to the individual student; the students had different levels of understanding and independence. Some students seemed to manage the 'transition' between different actors and contexts without the support of the supervisors, taking on the role of brokers.

5 Discussion

This study explores students' perception of the use of thematic assignments and their contribution to meaning-making and understanding of vocational concepts. These findings illustrate that students perceive the thematic assignment as supportive during their work placement and emphasise the decisive role of the vocational teacher because thematic assignments are not self-running but depend on individual use. Furthermore, as highlighted by teachers and students (Table 3), thematic assignments need certain key elements, for instance merging various perspectives and be both standardised and flexible to become valuable tools and act as boundary objects.

Star and Griesemer (1989) emphasise that boundary objects should be adaptable to local needs. Teachers seem to manage this adaptation in collaboration with students and supervisors, visible through the questions asked and by the support they receive during the work placement. Students report that teachers manage most of the adapta-

tions; teachers adapt to the context and students' understanding and motivation through their visits and discussions with supervisors. This adaptation can lead to mastery and increased understanding, as seen in statements like "the teacher helps me to understand", contributing to increased motivation for work among students.

Students, supported by the vocational teachers, discuss their teachers' help to clarify what is expected of them during the work placement and how the teachers support them in working on the thematic assignments. The students intend to ask questions to the supervisor; however, many need teachers' support (Evans et al., 2010; Ferm et al., 2018; Fuller & Unwin, 2003). With the thematic assignment, the teachers have an agenda for their visit (Johannesen et al., 2022), using thematic assignments as tools to facilitate learning. When the teacher and the student collaborate through the thematic assignments, they gain insight into each other's knowledge, using them as a bridge (Akkerman & Bakker, 2011a) and gain insight into their work lives. Recognising students' discontinuity, caused by the distinct learning sites, helps teachers to better support and plan their learning.

The students need to integrate and enhance different types of knowledge (Billett, 2009, 2014; Bouw et al., 2019, 2020; Stenström & Tynjälä, 2008) to consider multiple perspectives and form a comprehensive understanding. Vocational teachers intend thematic assignments to support this integration, but students have different motivations for completing them. However, students understand why the thematic assignments are beneficial and how they support learning integration. They develop an awareness of why and how. This can be seen in how the thematic assignments, particularly their use, contribute to link the two learning communities. The importance of a deliberate educational design is emphasised by Akkerman and Bakker (2012) who state that this is necessary to reach the full potential of dual education. When the students discuss the thematic assignments, they refer to how they 'connect' what they learn at school with the work tasks. It is visible that the interaction, through the thematic assignments, contributes to the students' meaning-making (Aarkrog, 2005; Bijlsma et al., 2016; Lave & Wenger, 1991).

The findings show that the affordances of the thematic assignments are managed differently. An agent needs to perceive the affordances of an object (Olesen, 2016); this emphasises the critical role of the VET teacher in supporting the students to cross boundaries and re-establish continuity. Boundary objects with *clear affordances* can help different groups understand how to use them, facilitating better communication and collaboration. Johannesen et al. (2022) found that systematic development of vocational didactics related to the integration of learning from two learning communities is feasible. If a boundary object has easily identifiable affordances, different groups can use it more effectively. However, this study indicates that a systematic approach with boundary objects that inherit recognisable affordances still depends on individual choices. The student interviews show how the vocational teachers vary in their approach to work on the thematic assignments, and how some students are confused about what is expected. Even though boundary objects should be 'adaptable to local needs' (Star & Griesemer, 1989), challenges remain in following all three phases (Figure 1). Berner (2010) discusses the importance of school-based learning; in this study, the students perceive that teachers emphasise school-based learning differently.

The students also need support to take on the role of brokers for the transition of experiences from work to school. To prevent that students become stand-alone brokers, it is beneficial for teachers and supervisors to acknowledge and use the boundary object as a link between both worlds. This collaboration can enhance students' mastery and increase their motivation (Helms Jørgensen et al., 2019). By taking the role of brokers, teachers, and supervisors can better support students in their meaning-making process. Allocating and assigning responsibilities in different contexts and utilising a boundary object, such as thematic assignments, can serve as an agreement between them (Bakker & Akkerman, 2013; Bouw et al., 2021). Riis and Brodersen (2021) argue that teachers should be aware of the limitations of a boundary object and acknowledge the role of the brokers. When the students discuss the diary, their feelings about writing vary greatly. Even though the students know the answers, the burden associated with writing is visible for some (Stoffels et al., 2022). However, the vocational teachers seem aware of these feelings and discuss how they try to adapt their guidance and expectations to each student.

6 Conclusion

In this study, the students have different pre-knowledge, skills and capabilities when attending the work placements. The work placements as well take place in distinct companies, which result in various experiences students can potentially make. Hence, there is a need for a magnitude of approaches from the teachers' or supervisors' perspective to help students detect, identify, and unfold the vocational concepts at the workplace to finally make meaning of them.

Boundary objects have an inherent dynamic nature and a kind of flexibility because they are not constructed or meant as self-instructing and self-running tools. The dynamic nature of boundary objects makes them particularly valuable in collaborative environments where multiple perspectives need to be integrated. The collaboration between the parties could be improved by increasing insight into each other's worlds and leading to the linking of learning in school and the workplace (Etzkowitz, 2012). However, the students highlight the importance of teacher support; understanding the affordances of boundary objects can enhance their effectiveness in bridging gaps between different communities, making them more valuable and accessible to all parties involved. Many are involved in the meaning-making process: peers, supervisors, and teachers. However, it is ultimately the students themselves who can find meaning in a concept.

The development of sustainable learning practices by students to 'make meaning' of their experiences is presumably under-researched. This study suggests that learning from practice is enhanced through intersubjectivity, defined as "the shared understanding of meaning by two or more persons either directly in relationship or over distance or time through language" (Cody, 1996, p. 52), facilitated by brokers. Vocational teachers, in relation to boundary objects, support meaning-making during students' work placement. However, the lack of teachers using thematic assignments to support students' learning may suggest that, for some teachers, these thematic assignments function as boundary objects in the absence of teacher involvement, mistakenly perceived as self-

fulfilling. The use of thematic assignments can contribute to the students' understanding of concepts; however, it is important to remember the value of 'immediate' learning and the contribution of pedagogically rich activities (Köhler & Goller, 2024).

The theoretical contributions of this study can provide a framework for future research in boundary learning VET. Future research could explore the roles of students and companies, as well as the co-determination of the curriculum in the school-based part of VET. Additionally, it would be valuable to examine how changes in societal competence needs, influence boundary learning in relation to students' work-life experiences on a broader scale.

The analysis was conducted just within one specific vocational education context, the sales and service programme, and on a process (3 phases; Figure 1.) over all participants to show change or growth and meaning making. A rather specific analysis and deeper insight can be gained if the investigation would follow the individual student and their individual concept development and meaning-making process to enhance the evidence for the usefulness of using the thematic assignment as boundary object. This as well can support even stronger the claim that the boundary objects need to be applied didactically adaptive regarding the students' prerequisites and needs. Hence, future research should aim on the one hand to include more samples across various vocational programmes and, on the other hand to give evidence by following individual students over time to strengthen the robustness and applicability of the results. Nevertheless, it contributes to the question of 'how' to facilitate boundary learning through the use of boundary objects and enriches the discussion by raising the students' perspectives. It shows the potential of specific boundary objects to support students' meaning-making and how teachers' individual choices influence learning opportunities and outcomes.

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