NAVIGATING KNOWLEDGE ZONES: LEARNING AND CREATIVE KNOWLEDGE DEVELOPMENT IN INTERDISCIPLINARY TEAMS

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Abstract

This study examines which criteria that promote creative knowledge development within an interdisciplinary team. In modern workplaces, interdisciplinary teams are often brought together to craft collaborative learning and innovative solutions. There is, however, a need for further exploration of how adults with different areas of expertise achieve collective learning and generate new ideas. Our research question was: what characterizes creative knowledge development in interdisciplinary teams working with municipal digitization? In this study we lean on sociocultural theories of knowledge, specifically Bakhtin's notion of dialogue and the Vygotskyan Zone of Proximal Development. Our findings are based on analyses of semi-structured qualitative interviews (n=7) with employees working in an interdisciplinary team with digitization of municipal services in a Norwegian municipality. The team members were developers, engineers, a designer, and a business developer and had been working together for several years. We chose this particular team because its members were believed to offer rich descriptions of how they viewed creative knowledge development. The goal of the team was to develop a mobile app that communicates municipal information to its citizens clearly and accessibly. Interdisciplinary knowledge is vital in this work, as digitization of municipal citizen services are complex tasks requiring a vast array of expertise. We analyzed the interview data inductively which involves identifying patterns, themes, or insights from the data without preconceived theories or hypotheses. This inductive data analysis was combined with a hermeneutical approach. This gave us a deeper interpretation of the data by considering the contextual and interpretive meanings behind the emerging patterns and themes on how team members perceived creative knowledge development. This resulted in three main themes describing what actions that promoted the creative knowledge development. We identified three actions that became central to creative knowledge development in the team: to explain one's reasoning, accept different viewpoints, and foster relational openness. Effective communication and diverse expertise were seen as crucial for creative knowledge development, while ambivalence between structured processes and creative freedom was both challenging and stimulating. Additionally, a psychologically safe environment was essential for encouraging open dialogue and innovative thinking. The individuals in the examined team represent distinct knowledge zones, each driven by their expertise. Creative understanding emerges when these zones intersect, and interdisciplinary perspectives come into play. This study highlights the critical role of social interaction and emotional support in fostering creativity within such teams, emphasizing that a safe environment, or safety zones, is essential for effective knowledge creation and collaborative development. The educational benefits of this study include enhancing students' ability to collaborate across disciplines, improving their communication skills, and fostering a deeper understanding of how to generate creative solutions. By emphasizing the importance of a psychologically safe environment and the acceptance of diverse perspectives, the study also prepares students to thrive in team settings, which is increasingly vital in both academic and professional contexts.

Keywords: creative knowledge development, collaborative learning, interdisciplinary teams, interaction, sociocultural perspective.

1 INTRODUCTION

This article reports from a study examining what characterizes creative knowledge development in interdisciplinary teams working with municipal digitization. Creativity refers to the ability to create something new or original [1]. New ideas must however also be paired with value or usefulness to have practical utility for others [2]. For something to be deemed creative, it must hence be both innovative and beneficial [1]. In both educational and workplace settings, interdisciplinary teams are frequently utilized to foster creative knowledge development. The reason for wanting to explore creative knowledge

development in the public sector is that municipal digitization is highly relevant to the continued growth of Norwegian society. Most municipalities are digitizing their citizen services. Interdisciplinary knowledge is vital in this work as citizen services handle complex tasks requiring different expertise. The chosen team could demonstrate how the conditions for creativity and knowledge development among individuals with high, interdisciplinary expertise can be optimized.

The article departs from a sociocultural understanding of learning, where interaction and collaboration are fundamental to knowledge development – not just as a positive element in the learning environment [3]. Knowledge emerges between individuals who engage in an inseparable interaction, and the quality of the interaction processes between people is crucial for learning [3]. Creative knowledge development is thus here understood as knowledge development aimed at generating new ideas and solutions through collaboration. This includes the group members generating new perspectives and understandings both at the individual and group levels, as well as at the societal and domain levels [4] .

1.1 Creativity as social knowledge development

While early creativity research focused mainly on individual factors like abilities, IQ, personality, and motivation, research from the last decades has shifted to exploring social and collective aspects of creativity [2], [5], [6], [7]. Recent research acknowledges that creative individuals are products of their time, family, and social sphere [8], [9].

In a sociocultural perspective, knowledge development is socially conditioned and based on the idea that different people have different knowledge. Knowledge is understood as being distributed among individuals who have skills and expertise in different areas [3]. The understanding of creativity in this perspective markedly differs from individual-centered and social-psychological traditions [10]. Instead of focusing on static entities such as products or personal abilities, the emphasis is on the dynamics of intersubjective processes. Creativity is defined as a fundamentally social phenomenon, a collaborative process [11]. The creative process emerges between individuals who communicate and interact with one another.

1.2 Dialogue as a knowledge process

A central perspective in a sociocultural understanding of knowledge development is Bakhtin's concept of dialogue [12], [13]. It offers valuable insights into the characteristics of human communication and is highly relevant to understanding creative knowledge development and learning. A fundamental principle in his understanding of dialogue is that it involves the dynamic interaction between different voices [14]. This is expressed in a complex and constant dialogic interaction and confrontation where new meanings are created and exchanged [15]. Since existence is dialogic in Bakhtin's ontology, knowledge must also emerge through mutual dependence within a vast network of relational dialogues among different voices.

Bakhtin [12] perceives dialogue as an exchange rooted in reciprocity. He does however not imply that dialogue solely fosters consensus and harmony – quite the opposite. When heterogeneous voices come together, we alternate between partial understanding and misunderstanding, confusion and revelation, as we gradually build new understanding and collective knowledge [12]. There is no requirement for consensus, as each individual possesses a vast array of internal dialogues – echoes of previous voices – that we will always encounter others with different thoughts, voices, perspectives, or ideas. This heterogeneity, resistance, or disagreement is a phenomenon Bakhtin suggests we should accept and celebrate, rather than view it as something wrong [14]. Diversity and resistance are not seen as threats but as valuable resources for generating new ideas [16].

Bakhtin contends that communication requires an active, creative approach that fosters the emergence of new ideas, a process he terms creative understanding [17]. Thus, Bakhtin asserts that other perspectives are crucial for achieving new understanding and that dialogue inherently possesses a creative nature, as new elements emerge when different voices intersect.

Polyphony is central to Bakhtin's concept of dialogue, as it enables multiple and different voices and consciousnesses to coexist without having to merge into a single perspective [17]. Polyphony is regarded as a creative process, where different perspectives interact and further develop their voices dialogically, without monologic control [5], [10], [17]. The concept of polyphony is highly relevant for understanding modern, interdisciplinary teams, where it is crucial to activate all members' diverse voices and communication styles to generate new ideas, actions, and understandings collaboratively [5].

1.3 The zone of proximal development

Vygotsky's theory of the zone of proximal development [18] is relevant to this study because it can shed light on how creative knowledge development occurs in interdisciplinary teams. While Bakhtin focuses on diversity and tensions as prerequisites for development, Vygotsky emphasizes a more harmonious way of development [19].

For Vygotsky, social interaction is the very foundation of learning and development. He illustrated this in a model [18] that shows how individuals can advance in development and learn something new with the help of others within a certain range. The model defines the gap between what an individual can achieve independently and what they can achieve with assistance or interaction with a more competent person. The model demonstrates how knowledge development occurs socially among participants with varying levels of skill.

John-Steiner [20] incorporates emotional support into Vygotsky's zone of proximal development and argues that the model is useful for understanding how collaborating adults in workplaces create emotional scaffolding around each other to succeed in their cooperation. According to John-Steiner [20], emotional support creates a safe zone where both support and constructive criticism can thrive. This allows colleagues to leverage each other's similarities and differences – such as complementary knowledge, work habits, temperament, and motivation – which are essential for effective collaboration.

1.4 Research question

Building on the preceding theoretical framework, the current study posed the following research question: *What characterizes creative knowledge development in interdisciplinary teams working with municipal digitization?*

2 METHODOLOGY

The study is based on qualitative semi-structured interviews with employees in a team working with creative development. We chose to refer to our participants in the study as participants, indicating a more active role of the persons being studied, in accordance with guidelines prescribed by Morse [21]. The study departs from a constructivist and hermeneutic view of knowledge development [22]. We consider knowledge to be formed through a collaborative process between researchers and participants [23], a dialogue that facilitates the exchange of knowledge, reflections, impressions, and interpretations.

2.1 Participants

The interviewed participants were working together in a multidisciplinary team in a municipality. The team was chosen based on purposive sampling [24], because the team was believed to provide rich information on creative knowledge development. The team was selected strategically to ensure the collection of rich, detailed descriptions of the issue under investigation. In choosing both the team and informants, we prioritized diversity in factors such as age, professional discipline, gender, educational background, roles, and the length of time they had worked together. Ultimately, a multidisciplinary team that had worked together for several years to develop and continuously improve a mobile app for citizen services was chosen. Seven employees from the chosen team were invited to be interviewed; however, the team consisted of more than just these seven members. The interviewed team members were various developers, engineers, a business developer, and a designer. Informed and written consent was obtained from the participants prior to the interview.

2.2 Interviews

The interviews were semi-structured interviews, carefully following the designed interview guide. All interviews started with a brief introduction that included a personal touch to reduce the relational asymmetry [25] and concluded with a debrief to address any discomfort related to the interview. The interviews were on average 60 minutes long and were audiotaped. The first author conducted and transcribed all the interviews. Due to the Covid-19-pandemic and in contrast to what was planned, the interviews were held remotely on digital platforms, or by phone.

2.3 Analysis

The data have undergone a systematic analysis characterized by a combined inductive and hermeneutic approach. A continual movement between the transcripts, interpretations of the transcripts, the context, and our preunderstandings have characterized the analysis [26]. In the first phase, central categories were identified when reading through the transcripts. These categories organized the content of what the informants conveyed as a whole and functioned as salient domains [23]. These categories were also the starting point for the coding. The coding resulted in four categories of thematical interpretation around which the findings have been framed. The four categories were 1. Communication, knowledge and learning, 2. Difference and interdisciplinarity, 3. Structure or autonomy, and 4. Safety and trust.

After several iterations of analysis, using analytic reduction or in Malterud´s terminology [27], condensation, we found that the creative knowledge development in the team was characterized by three main tendencies: communication, conflicting positions, and relational security. To answer the research question of this article, we then identified three actions derived from the four categories that characterized the creative knowledge development in the team.

3 RESULTS AND DISCUSSION

Our analysis identified three actions that were described as central to the creative knowledge development in the team, namely, to explain one's reasoning, accept different viewpoints, and foster relational openness. After discussing and outlining the content of these three actions, their role is demonstrated in a model that presents the dialogical dynamic of creative knowledge development in interdisciplinary teams (see Fig. 1).

3.1 Explaining the reasoning

All team members considered communication and dialogue with others as crucial for their individual creativity and creative knowledge development within the team. A particularly important element of the communication was related to linguistic explanations and descriptions; interaction and time to elaborate one's position fostered understanding. To explain one's reasoning and explicate the thought processes behind an idea was considered to be just as important as the idea itself. As formulated by one of the team members, Lise:

I really enjoy the part of the process where people not only show what they have done but also explain why they did it. The reasons behind people's actions are very interesting. Often, it might be a problem that others haven't considered at all, which in turn can inspire making the next draft even better.

Explaining the reasoning behind one's proposed solutions to the other team members helped to expand the creative knowledge process of the team, and became what Line described as a "cross-pollination" of ideas and solutions. This was perceived as particularly effective for the creative process. A prerequisite for such a "cross-pollination" to take place was, according to several of the informants, the diverse expertise of the team members. The interdisciplinary nature of the team helped in gaining new perspectives and seeing new possibilities. The informants emphasized that interdisciplinary collaboration requires an open dialogue and communication between them. Response, feedback, and evaluations were seen as crucial aspects of the creative process – elements that are considered to enable active dialogue [12], which is important for generating creative understanding [28]. A key premise in the creative process of the team was, according to one of the interviewees, Vegard, to constantly invite others to collaborate:

It's important that what I say is perceived as 'here I want to involve you', and not that I'm presenting something that's already been decided. I always want feedback, rather than presenting something as final.

Vegard's invitation highlights the gap between his current abilities and what he believes he can achieve through collaboration with others who have more knowledge or different expertise, i.e. the zone of proximal development [18]. Exchanging ideas back and forth was mentioned as common in the team. Such continuous negotiations and renegotiations play a fundamental role in Vygotsky's zone of development [14], where individuals scaffold each other's learning. In such a team, the different actors represent heterogeneous voices, where no one owns the words alone, but we share the words as partly yours and partly mine [12], [14], [28]. The meaning-making becomes dialogic because words are shaped in a relational community between different voices, and not presented as monological "conclusions".

3.2 Accepting different viewpoints

The second finding concerned the impact of ambivalence and conflicting positions in creative processes and the importance of accepting different viewpoints. In the investigated team, this for example involved an ambivalent contradiction between "play" and "delivery", and the experience of what creates the best conditions for creative knowledge development. There was a collective awareness that structures are beneficial for creative knowledge development, yet freedom and autonomy were prioritized in interactions within the team. One of the participants who highlighted this collective ambivalence was Synnøve, stating at one point that:

One must dare to explore and dare to fail. Sometimes it doesn't yield any value, but you have dared to explore, and there is always some experience and value in that.

While a moment later she was acknowledging that:

It is very unfortunate if we become super-creative and get trapped in a bubble, becoming an innovation department that doesn't care about delivering services to the municipality's residents.

The tension between external and internal needs, both within and outside the team, appeared to be a defining characteristic of the interdisciplinary collaboration in the team. This tension however appeared to be primarily perceived as a positive tension, raising the standards for interaction and communication, contributing to understanding between conflicting positions, and fostering creative knowledge development within the team. The tension that the conflicting positions gave rise to were seen as constructive confrontations, as formulated by Tom:

There is a lot of resistance, but it's the good kind of resistance – the kind you're excited to have in a creative team. Because if you don't have resistance, there won't be any creativity. It's not creativity if there aren't problems, right? It's when resistance arises that you figure out how to solve it; that's when it becomes creative.

While some of the participants described these contradictions as somewhat problematic, it seemed that everyone shared a desire and interest in fostering the best possible creative environment for the team. The ambivalence sharpens the demands for interaction within the team, which may also explain why several informants indicated that the collaboration is occasionally socially demanding. The ambivalence characterizing the team's interaction can be illuminated through Bakhtin's concept of polyphony [13]. The various participants appear as autonomous, each representing a knowledge zone, and collectively form heterogeneous knowledge zones in motion due to their interactions. The ambivalence activates various voices relationally, which catalyzes new thoughts, actions, and understandings in the interaction [5].

3.3 Fostering relational openness

Finally, safety and inclusion were mentioned as central factors for the creative process in the team. All the informants recognized relational openness and honesty as crucial for successful creative collaboration and noted that fostering relational openness had been an active focus for the team. Ståle expressed it this way:

I think it's very important for everyone to feel that it's okay to discuss things openly. That you don't feel like you're saying something stupid or wrong. I believe this is important if we want everyone to contribute effectively. Yes, for many reasons, psychological safety is important.

A psychologically safe environment is characterized by employees who "speak up, offer ideas, and ask questions without fear" [29, p. 15]. Mette emphasized that chemistry and trust are crucial for daring to put oneself in a vulnerable position, to make a "bad" suggestion, or to ask questions. The relational openness was described as a prerequisite for bringing forward new and unconventional solutions and proposals within the group. At the same time, several others mentioned that being honest about not liking an idea is just as important, and they emphasized that there is a strong culture of honesty in the team. Lise expressed that anxiety hinders creativity and that she finds it very liberating not to have to "sugarcoat" things in discussions out of fear of hurting someone. Moreover, several team members mentioned that digital communication via chat had been detrimental to team collaboration. It had led to several misunderstandings and impeded mutual understanding.

At the same time, different participants had varying perspectives on how safety within the team manifested. Even though the team perceived their creative knowledge development as effective, the collaboration was not always described as ideal, pointing at somewhat negative tensions. Some informants mentioned 'social cliques', slightly exclusionary tendencies and team members that did not

contribute much to the discussions. Several of those who were not interviewed in this study were characterized as passive. Moreover, one of the interviewees, Mette, mentioned that "[t]he solution seems to be chosen by consensus because the loudest speaker gets their way". This statement contrasts with the idea that the team is characterized by open discourse, and highlights how challenging Bakhtin's ideal of dialogue – and psychological safety – is in practice [12], [13].

3.4 Navigating heterogeneous knowledge zones: a model

The dialogical dynamic appears to be a fundamental prerequisite for creative knowledge development in interdisciplinary teams, allowing heterogeneous knowledge zones to transition into mutual development zones. To illustrate this dialogical dynamic, we developed a model on how learning and creative knowledge development depend on participants' ability to navigate their own knowledge zones. The model seen in Fig. 1 draws implications of the study's empirical findings and illustrates how creative knowledge development is characterized by dialogical interactions between knowledge zones, development zones, and safety zones.

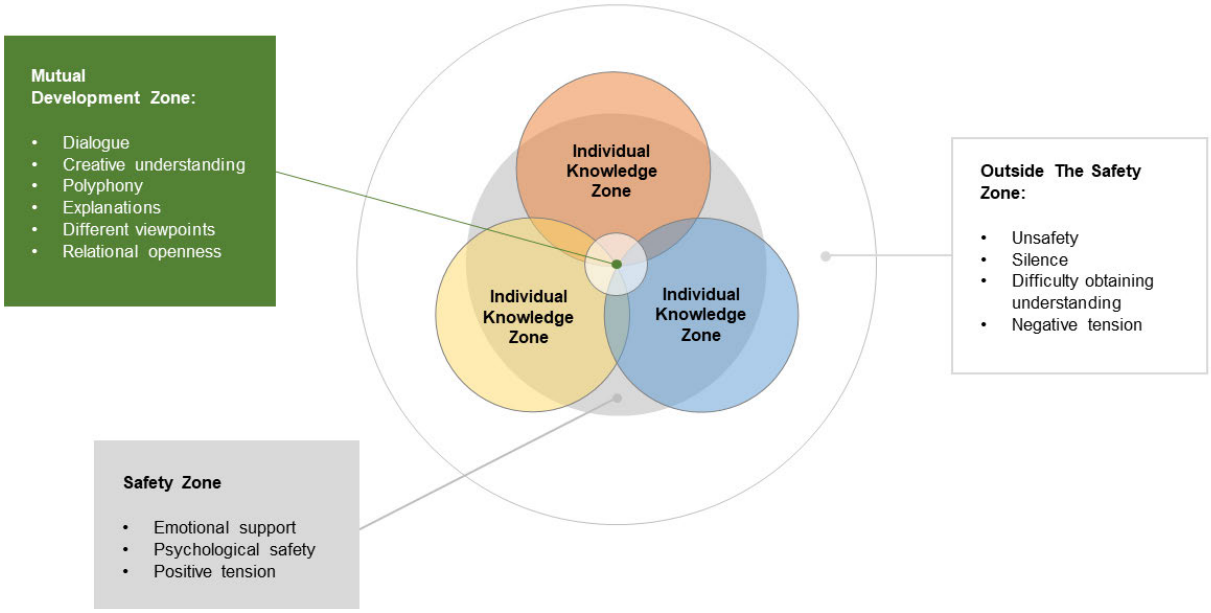

Figure 1. A model of heterogeneous knowledge zones in motion

As seen in Fig. 1, we found that creative knowledge development is characterized by different individuals constituting various heterogeneous knowledge zones, powered by their unique expertise. As participants negotiate meaning through dialogic interaction, these knowledge zones are put in motion. *Creative understanding* comes to fruition when knowledge zones converge, represented by the green center in the model. At this convergence point, individuals enter reciprocal *development zones* where knowledge is co-created. This co-creation of knowledge is fueled by positive tension where heterogeneous voices are merged polyphonically. Interdisciplinary perspectives, however, also create negative tension hindering learning and knowledge creation, at which point knowledge zones drift towards isolation. Consequently, individual knowledge zones rely on *safety zones* to promote co-creation of knowledge. Without emotional support and psychological safety, as illustrated in the grey area, explaining the reasoning behind one's ideas becomes less likely, counteracting different viewpoints and creative knowledge development. Instead of growth, there is silence, relational unsafety, and difficulty obtaining understanding, illustrated in the model as being outside of the safety zone. The ability to navigate heterogeneous knowledge zones and mobilize the accumulated knowledge within the team requires relational openness and responsive participation between *all* team members.

4 CONCLUSIONS

In education and workplace settings, interdisciplinary teams are often brought together to craft collaborative learning and innovative solutions. This study aimed to examine which criteria that promote creative

knowledge development within interdisciplinary teams. The research question was: *What characterizes creative knowledge development in interdisciplinary teams working with municipal digitization?*

Our findings are based on an inductive and hermeneutic analysis of semi-structured qualitative interviews (n=7) conducted with employees engaged in an interdisciplinary team focused on the digitization of municipal services within a Norwegian municipality. We identified three actions that were described as central to creative knowledge development in the team: to explain one's reasoning, accept different viewpoints, and foster relational openness.

The findings show that the dialogical dynamic appears to be a fundamental prerequisite for creative knowledge development in interdisciplinary teams, allowing heterogeneous knowledge zones to transition into mutual development zones. Despite encountering certain dysfunctional aspects, the investigated team nonetheless succeeded in achieving an environment conducive for creative knowledge development. They did so by allowing different perspectives in their communication, which fostered a deeper understanding of how to generate creative solutions, and an acceptance of diverse perspectives. Moreover, they have maintained an active focus on relational openness, in addition to the actual tasks they are working on.

The educational benefits of this study include enhancing students' ability to collaborate across disciplines, improving their communication skills, and fostering a deeper understanding of how to generate creative solutions. Furthermore, the study highlights the importance of a psychologically safe environment and the acceptance of different viewpoints. We identify these criteria as central to thriving in creative knowledge development within interdisciplinary teams, which is increasingly vital in both academic and professional settings.

While this study sheds light on key factors promoting creative knowledge development in interdisciplinary teams, particularly in the context of municipal digitization, several areas remain underexplored and warrant further investigation. Future research could focus on longitudinal studies to examine how creative knowledge development evolves over time within interdisciplinary teams. Understanding the long-term effects of relational openness, psychological safety, and dialogical dynamics could offer deeper insights into sustaining creativity in teams over extended projects or organizational shift.

Further; this study focused on a municipal setting; however, creative knowledge development is vital across various sectors. Comparative research across different organizational contexts (e.g., corporate, healthcare, academia) could highlight sector-specific dynamics and determine whether the criteria identified in this study (e.g., explaining reasoning, accepting viewpoints, fostering openness) apply universally or need adaptation.

Finally, future research could benefit from exploring how a deeper understanding of heterogeneous knowledge zones in motion can influence creative knowledge development in interdisciplinary teams.

By addressing these areas, future research could deepen our understanding of how interdisciplinary teams can be optimized for creative knowledge development and contribute to both educational practices and workplace innovation.

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