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Quality viewed through the lens of the ‘five facets’ of doctoral supervision

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Abstract

Purpose: The purpose of this study was to suggest quality criteria that may be suitable for the evaluation and development of doctoral supervision.

Methodology: Three unpublished papers written by three authors for a higher education course in doctoral supervision were deductively analysed using the ‘five facets’ of doctoral supervision as an analytical framework.

Main findings: Findings from the analysis provide a broader picture of the different papers’ contributions to the ‘five facets’ of doctoral supervision and how values in a quality culture can support bridging the perspectives of quality in doctoral supervision with quality management. Furthermore, the authors suggest six overarching quality criteria for doctoral supervision: focus on the doctoral student’s needs, improve continuously by reflecting on supervision and the need for training, base decisions regarding supervision on lived knowledge and experience, allow the doctoral student to take an active part in forming her

or his research process, focus on supporting the doctoral student in the academic processes, and develop committed leadership by supporting and guiding the doctoral student.

Research limitations/Practical implications: Assessing quality and addressing areas for the development of doctoral supervision may serve as effective means of achieving higher standards in doctoral supervision.

Originality/Value: Identifying and assessing the quality of doctoral supervision may strengthen both the well-being and self-confidence of the doctoral student, as well as the supervisor's reflective capacity and practice development.

Keywords: Doctoral supervision, Quality, Measuring, Quality improvement

Paper type: Conceptual study

1. Introduction

The quality of doctoral supervision is a central factor influencing doctoral students' success, satisfaction and completion rates (Chrysoulakis, 2025, Haley et al., 2024, Tokatligil et al., 2024). High-quality supervision not only supports academic progress but also contributes to the professional and personal development of doctoral students (Friedrich-Nel & Mac Kinnon, 2019). Previous research emphasizes the multifaceted nature of effective supervision, involving both the supervisor's practices (Haley et al., 2024) and the broader academic environment, as well as the twofold objectives of promoting academic development and supporting the well-being of the doctoral student (Klefbeck, 2025).

While doctoral supervision is often regarded as a relational and pedagogical practice (Haley et al., 2024, Leijen et al., 2016), it is increasingly discussed in the context of quality assurance, quality management (QM) and quality culture within higher education (Saihu, 2020, Friedrich-Nel & Mac Kinnon, 2019). Bridging the perspectives of quality in doctoral supervision and QM provides a deeper understanding of how doctoral supervision can be supported and developed not only through relational competencies but also through organizational structures and evaluation criteria.

QM is a systemic approach to organizational development that is designed to connect customer needs, organizational values and goals with strategic planning and organizational culture and structures to continuously improve services and products for customers and stakeholders (Deming, 1986; Juran, 1989; Bergman et al., 2022; Dahlgaard & Dahlgaard-Park, 2006). In recent years, the focus has shifted to include more societal and sustainable needs in QM (Deleryd & Fundin, 2020; Mårtensson & Snyder, 2022; Silvestri et al., 2024) and to better understand how QM is applied in practice in terms of actions and behaviours (Mårtensson, 2022; Sten, 2023).

In doctoral education, the focus is on the doctoral student's learning and development. As knowledge is built and development occurs, the doctoral student's situation changes over

time, which is why supervision must be continuously adapted according to the person's changing needs (Bergnéhr, 2013). Quality in doctoral education is often quantified and measured in terms of throughput and degree of fulfilment of the learning objectives for the education (Bergnéhr, 2013). However, there are also methods and tools for measuring the quality of the relationship between doctoral students and their doctoral supervisors and the quality of the doctoral students' experiences with supervision (Jonck & Swanepoel, 2016, Lee & McKenzie, 2011). Research also highlights the importance of institutional strategies, such as regular evaluations, supervisor training and clear structures, to create the conditions for high-quality supervision (Kiley, 2011).

Although quality in doctoral supervision is interpreted in various ways, there remains a need for a more integrated understanding of supervision as a form of professional academic practice (Halse & Malfroy, 2009). Such an understanding should also consider how principles of QM can contribute to the ongoing development of doctoral supervision practices and the enhancement of doctoral students' experiences. With this introduction, the purpose of this study is to suggest quality criteria that may be suitable for evaluation and development of doctoral supervision.

2. Theoretical background

2.1 Framing quality

To frame quality, both the definition and approaches of quality are briefly described. There is no agreed-upon definition of or approach to quality. The definition appears to be context-dependent and varies over time. A commonly used definition in Sweden is that presented by Bergman et al. (2022, p. 33): "*The quality of a product is its ability to satisfy, or preferably exceed, the needs and expectations of the customers*". Despite the use of the wording 'product' and 'customer', this definition can be considered business independent if the clarifying text is read. Bergman et al. (2022) clarified that the definition should be adapted to each context and that quality should instead be viewed as a concept. Regarding the approach to quality, many concepts are usually framed in terms of 'quality management' (Dahlgaard-Park, 2011). In the Swedish context, Bergman et al. (2022) used the 'cornerstone model' as a concept of Total Quality Management (TQM). The cornerstone model contains six different values as a foundation for a culture that together constitute an interrelated system. The six values are as follows: focus on processes, improve continuously, focus on customers, base decisions on facts, let everyone take an active part, and develop committed leadership (Bergman et al., 2022). In the context of higher education, the concept of quality culture involves fostering shared values and beliefs combined with structural and managerial elements (Harvey, 2024).

Quality also means creating value (Lilja, 2010), and it is through those who value the value (customers) that quality can be evaluated (Deming, 1986). The meaning of value can be presented through phrases such as, "*I want...*", "*I get...*", "*I enjoy...*" (Goldberg et al., 2009, p. 158). Customer value is linked not only to meeting and exceeding customer needs but also to delivering value effectively and efficiently (Prahalad & Ramaswamy, 2004).

Carlson and Wilmot (2006) reported that enhancing internal customer value creation also increases the ability to provide high-value creation for external customers.

The concepts of quality are evolving. Deleryd and Fundin (2025) described a movement from a customer focus towards societal satisfaction in taking greater responsibility for sustainability. Silvestri et al. (2024), suggested a new definition for TQM that includes responsibility for all three pillars of sustainable development. These two examples include not only definitions but also the importance of developing all the elements from the underlying culture, from principles to behaviours.

2.3 Quality aspects of doctoral supervision

To ensure the quality of supervision in the long run and to continuously develop it, instruments and evaluation methods that can be linked to existing quality assurance processes within the university's organization should be prioritized (Lehner et al., 2021). Snyder et al. (2010) reported a systemic model including a variety of factors to measure quality in education and the quality of experience. The authors perceive that the present models of learning and assessment must expand beyond traditional cause-and-effect relationships to adapt to the systemic and complex nature of learning and knowledge development that is the reality in the digital age and networking society.

Anttila et al. (2024) highlighted the importance of encouraging the alignment between doctoral students' and supervisors' perceptions of the quantity and quality of supervision, as doing so seems to promote progress for doctoral students, increase their satisfaction and reduce the risk of terminating their doctoral studies. Heats (2002) argued that when analysing supervision from the perspective of doctoral students, the frequency of meetings between supervisors and students is essential; however, the quality of these meetings is even more important.

Another area that is important for the development of doctoral students and for the quality of supervision is the supervisor's knowledge of good research ethics. Löfström and Pyhältö (2021) defined ethics in doctoral supervision as "*consisting of normative principles about what is and what is not acceptable*" (p. 296). Research shows that most students learn ethical guidelines and codes of conduct from their advisors or senior colleagues, who serve as role models for ethical conduct or the lack thereof, as demonstrated by the behaviour and values manifested in supervision practices (Alfredo & Hart, 2011).

2.2 The concept of doctoral supervision and the supervisor's role

Severinsson (2012) defined the concept of supervision as "*a pedagogical process, where clinical experiences are clarified and systematized in a professional context*" (p. 215–216). Research shows that doctoral supervision contributes to a doctoral student's well-being and satisfaction, as well as how the doctoral student has developed his or her competencies during studies (e.g., Ives & Rowley, 2005; Mainhard et al., 2009; van Tienoven et al., 2022; Zhao et al., 2007). Dericks et al. (2019) argued that supervisors seem to be the largest contributors to doctoral students' overall job satisfaction. Thus, the success of supervision and the progress of the doctoral student rely on how well supervision is performed in relation to the needs and satisfaction of the doctoral student. Consequently, supervision is an

important element of successful doctoral studies; however, the quality of supervision varies greatly (Parada & Peacock, 2015). Mainhard et al. (2009) argued that doctoral supervision includes interpersonal relationships between supervisors and doctoral students, and Anttila et al. (2024) emphasized emotional support as a key characteristic of high-quality supervision. Bergenheim and Ågren (2008) posited that a substantial amount of knowledge and reflection is required on the part of the individual supervisor for supervision to work well.

The role of being a doctoral supervisor as well as that of being a doctoral student involves knowing how to handle the tensions between the professional role as an academic and the personal self, as well as how to encourage doctoral students to move along the study path towards increasing independence (Lee, 2008). This is a balance between helping doctoral students and letting them handle problems on their own. Furthermore, Lee (2008) argued that the supervisor's own experience as a student is a great strength.

A key factor for successful supervision is the supervisor's interest in supervising (Lindén, 2020). Franke and Arvidsson (2011) described two types of supervision: research practice-oriented supervision and research relationship-oriented supervision. The first relates to whether the supervisor and the doctoral student participate in a common research practice, and the latter focuses on the relationship between the supervisor and the doctoral student. Another form of supervision is process-oriented supervision (Franke & Arvidsson, 2011), which emphasizes the overall perspective of supervision by viewing it as a process of change and learning in which both the supervisor and the doctoral student are involved.

A supervisor is responsible for ensuring that the doctoral student receives information, training and guidance on good research practices, including the principles and rules of research ethics. At the same time, the doctoral student has a personal responsibility to follow the supervisor's example and instructions (if these are in accordance with good research practices) and to acquire information and education (Swedish Research Council, 2024).

2.5 Industrial doctoral students and the importance of a structured introduction

Interest in postgraduate education in collaboration with the business community has increased significantly since the 1990s, following the introduction of the 'third mission' in the Swedish Higher Education Ordinance (1993:100), which added societal collaboration to the existing tasks of education and research. Industrial doctoral students typically remain employed at their companies, conducting research related to their own work—often through long-term action research—which presents both opportunities and challenges compared with traditional academic research (Cronemyr, 2007). These arrangements place new demands on supervision, both academically and industrially (Salminen-Karlsson & Wallgren, 2008).

A well-structured introduction to supervision is essential for all doctoral students but is particularly important in industrial settings where dual roles must be balanced. Early conversations about expectations, hopes, and concerns can support mutual understanding and strengthen the relationship between students and supervisors (Lindén, 2007). Encouraging doctoral students to formulate personal goals at the outset and return to these goals regularly can further guide and personalize the supervision process (Lundahl, 2007).

Shared expectations between supervisors and students have been shown to positively influence satisfaction with the supervision experience (Pyhältö et al., 2012).

3. Methodology:

3.1 Background

This research has its starting point in three unpublished papers, which were written by the three authors separately for a higher education course in doctoral supervision. The first paper was a reflection on supervision of industrial doctoral students. The purpose of this paper was to propose additions to, and deviations from, traditional doctoral student supervision of industrial doctoral students.

The second paper consisted of an introduction for new doctoral students at a university in Sweden. The purpose of the second paper was to contribute insights into the introductory phase of employed doctoral students. The research questions asked in this paper were as follows: What does an employed doctoral student need to be introduced to at the start of a doctoral position? What can be included in an introduction for an employed doctoral student? How can the introduction at the subject level for an employed doctoral student be carried out?

The third paper aimed to reflect on the concept of doctoral supervision, the role of the doctoral supervisor and different aspects of quality in doctoral supervision. The paper reflected on quality in doctoral supervision by investigating previous research and described the author's own experiences as a doctoral student and as a doctoral supervisor.

The three papers have been shared among the three authors to share their thoughts and insights.

3.2 Five facets of doctoral supervision as an analytical framework

The procedure of analysing the three papers was inspired by Halse and Malfroy's (2009) five facets of doctoral supervision. Halse and Malfroy theorized that doctoral supervision is professional work that can be described in five facets, partly influenced by Aristotle's description of intellectual virtues (Aristotle, 1999, referenced in Halse & Malfroy, 2009), or the personal qualities of a good thinker or learner. The five facets, which are described as five sides of the same crystal, are the following: *the learning alliance*, *habits of mind*, *scholarly expertise*, *technê* and *contextual expertise*.

The learning alliance, which is seen as a key professional role, describes the agreement between supervisor and student to work on a common goal. According to Halse and Malfroy (2009), the learning alliance can be seen as mutual respect between the student and supervisor, flexibility in accommodating each other's personal and professional circumstances, clear communication and explicit strategies for progressing towards their common goal. It is the supervisor's responsibility to recognize and respond to the needs of different students.

Habits of mind can be understood as both a disposition and a mode of behaviour (Halse & Malfroy, 2009). It can be referred to as practical intelligence or 'lived knowledge' and

involves the capacity to learn and reflect on the principles for making decisions in unfamiliar or unforeseen situations in ethically appropriate ways.

Scholarly expertise refers to theoretical knowledge acquired through reflection and thinking (Aristotle, 1999). This can include knowledge of the specific discipline as a result of continuous, fruitful participation in the production of knowledge by conducting research and publishing scientific papers, as well as knowledge of practical, real-world situations (Halse & Malfroy, 2009).

Technê can be viewed as a form of craft knowledge for supervising doctoral students. However, it involves more than technical skills, such as the creative, productive use of expert knowledge to accomplish an objective. Examples of *technê* include the capacity to write and communicate in accordance with the field, to use resources such as databases and scientific equipment, and to conduct data analysis and expertise in guiding students in organizing and managing their time (Halse & Malfroy, 2009).

Conceptual expertise is described by Halse and Malfroy (2009) as the ‘know-how’ to access the infrastructure and resources needed by the doctoral student, for example, knowledge of faculty and university policies, procedures and requirements for each stage of the doctoral process. However, it can also involve a sense of value and purpose of the doctorate and doctoral education as important parts of the work (Halse & Malfroy, 2009).

The results from the three papers have been deductively sorted into the five facets of doctoral supervision (and partly Aristotle’s description of intellectual qualities) (Halse & Malfroy, 2009). By viewing the three papers’ results through the lens of the five facets, a broad picture of the different papers’ contributions to the facets emerged. Furthermore, the analysis provided new insights into how this research could be further developed.

4. Findings

Table 1 shows the results from the analysis of the three research papers’ results from the perspective of the five facets of doctoral supervision (Halse & Malfroy, 2009).

Table 1. Viewing the three papers' results through the lens of the five facets of doctoral supervision, inspired by Halse and Malfroy (2009).

Facets of doctoral supervision	Paper 1 – Supervision of industrial doctoral students	Paper 2 – Introduction of new doctoral students	Paper 3 – Quality in doctoral supervision
The learning alliance (collaborative 'therapeutic alliance')	The learning alliance is very important for industrial doctoral students. The supervisor should guide the industrial doctoral student through the academic jungle, while at the same time the student 'knows' which path he or she wants to take.	Perhaps the most important relationship a doctoral student has is the one with their supervisors. It is therefore important to spend time building the relationship at the beginning of their doctoral education so that it becomes sustainable in the long term. The supervisor should provide support to strengthen the doctoral student's independence and progression in education so that he or she can achieve his or her goals. Clarification of expectations creates the conditions for an agreement on the goal.	The supervisor has a role to offer emotional support if the doctoral student wants and needs that. That may be part of high-quality supervision. If a supervisor does not listen, trust or show empathy or caring for his or her doctoral student, it will be harmful to the doctoral student's success. There is also a need to avoid the idea of a 'one size fits all model'. Collaborative knowledge and caring contribute to quality in doctoral supervision. A supervisor has a responsibility to ensure that the doctoral student receives information, training and guidance on good research practice, including research ethics principles and rules.
Habits of mind ('lived knowledge')	Habits of mind are very important for industrial doctoral students. However, lived knowledge may be more difficult to teach and learn when an industrial doctoral student is not situated in an academic research environment.	During the meetings with doctoral supervisors there is an opportunity to raise different types of issues and an opportunity for reflection on the supervision, leading to the development of the supervisors and the supervision itself. A doctoral student's supervisor has an important role in describing and introducing the doctoral student to the workplace culture.	Training for supervisors is important to build 'lived knowledge', especially for new supervisors. Other knowledge areas in which the supervisor needs to have competence are, for example, research equality and ethical issues. Lived knowledge contributes to quality in doctoral supervision.

Scholarly expertise (theoretical knowledge)	Scholarly expertise might be the supervisor's strongest point, according to Halse and Malfroy, when supervising industrial doctoral students. However, the supervisor needs to accept expertise from other areas.		Practice-oriented supervision means that the supervisor and the doctoral student are in the same research area, which facilitates the supervision. For example, the student and supervisor should use the same vocabulary terms and the same research methods, etc. Theoretical knowledge contributes to quality in doctoral supervision.
Technê (craft knowledge)	Technê or craft knowledge is more difficult with regard to industrial students. A thesis should be written in a certain way; however, the supervisor of an industrial doctoral student must allow enough freedom.	A doctoral student needs to gain knowledge and access to appropriate technical support. This is a prerequisite for the doctoral student to be able to carry out his or her assignment.	Doctoral supervisors need to train and develop their knowledge, skills and competence to become a high-quality supervisor. For example, competence around digital learning and digital tools is needed. It is crucial that the doctoral supervisor has competence in new technology for distance supervising. This also involves how to act in the digital room. Craft knowledge contributes to quality in doctoral supervision.
Contextual expertise (knowledge of infrastructure)	Contextual expertise is built into the system of the doctoral education. However, supervision of industrial doctoral students may require more clarity regarding governing documents and procedures.	The forms of supervision need to be designed locally as this is an area that is not formalized in national guidelines. A doctoral education guide has been developed, which is a guide for the doctoral students and support for the doctoral supervisors. To complement this guide, an introduction guide for new doctoral students has been developed.	There are rules for doctoral study plans on a university level that the doctoral supervisor should know about and follow. There are also other governing documents and procedures that are important for the supervisor to guide the doctoral student through. Knowledge of infrastructure contributes to quality in supervision.

4.1 *The learning alliance (collaborative 'therapeutic alliance')*

According to Halse and Malfroy (2009), *the learning alliance* refers to the agreement between supervisors and doctoral students on a common goal. Clarifying expectations when introducing a doctoral student will create conditions for an agreement on the doctoral student's goals. Furthermore, the learning alliance should incorporate flexibility in adapting to each doctoral student's personal and professional circumstances (Halse & Malfroy, 2009). It is the responsibility of the supervisor to recognize and respond to the needs of different students. There is no 'one size fits all model' regarding doctoral supervision. For industrial doctoral students, the learning alliance may be particularly important, as they are not usually within the academic environment.

4.2 *Habits of mind ('lived knowledge')*

Habits of mind can be referred to as practical intelligence or 'lived knowledge' and, from that foundation, as the capacity to learn, reflect and make ethically appropriate decisions in unfamiliar or unforeseen situations (Halse & Malfroy, 2009). For an industrial doctoral student, lived knowledge may be more difficult to teach and learn, as she or he is not situated in an academic research environment. The culture of a workplace reflects values, beliefs and behaviours developed over a long period of time within the organization (Schein & Schein, 2017). Therefore, the culture at a workplace can, to some extent, be compared to 'lived knowledge', including values, beliefs, principles and guidelines. As a doctoral student's supervisor, you have an important role in being able to make balanced judgement about the quality of students' work, to provide critical but constructive feedback and advice and to learn from these experiences and apply this learning in different situations with different students (Halse & Malfroy, 2009). 'Lived knowledge' likely contributes to quality in doctoral supervision; therefore, it may be especially important for new supervisors to train in building 'lived knowledge'.

4.3 *Scholarly expertise (theoretical knowledge)*

Halse and Malfroy (2009) argued that *scholarly expertise* encompasses knowledge of a specific discipline as a result of participation in the production of knowledge through research and publishing scientific papers, as well as knowledge of practical, real-world situations. Scholarly expertise or theoretical knowledge contributes to quality in doctoral supervision, for example, during practice-oriented supervision when the supervisor and the doctoral student are in the same research area, using the same vocabulary and research methods relevant for the research area and producing scientific papers. Scholarly expertise may also be the supervisor's strongest point (Halse & Malfroy, 2009) when supervising industrial doctoral students. The supervisor should be able to provide the industrial doctoral student with the knowledge (or sources of knowledge) that the doctoral candidate needs. Most industrial doctoral projects are interdisciplinary and require supervision and knowledge in several disciplines. There may also be documents and procedures at the

university or national level that are important for supervisors to guide doctoral students through.

4.4 *Technê (craft knowledge)*

Technê can be viewed as the craft knowledge for supervising doctoral students (Halse & Malfroy, 2009), which includes not only technical skills. For example, databases or digital tools can be used for data collection and analysis. However, the ability to write and communicate in accordance with the field is also important. It is important that a doctoral student gain knowledge and access to appropriate technical support. For industrial students, gaining craft knowledge may be more difficult, as the students are not part of the research environment and writing routines and may also be unfamiliar with the digital tools used in a specific research area. However, industrial doctoral students must also be allowed more ‘freedom’. Therefore, doctoral supervisors must develop their knowledge, skills and competence regarding digital learning and digital tools to become high-quality supervisors.

4.5 *Contextual expertise (knowledge of infrastructure)*

Halse and Malfroy (2009) described *conceptual expertise* as the ‘know-how’ to access the infrastructure and resources needed by the doctoral student, such as knowledge of policies, procedures and requirements for the doctoral process. This could be a locally designed infrastructure or contextual expertise. For example, it may take the form of a doctoral education guide or an introduction guide for new doctoral students. The supervision of industrial doctoral students may require greater clarity regarding governing documents and procedures, as these doctoral students may not be familiar with this contextual expertise.

5. Discussion and conclusions

This study examined three papers by three authors included as assignments for a course in doctoral supervision. The purpose of this study was to suggest quality criteria that may be suitable for the evaluation and development of doctoral supervision. To facilitate the analysis of the results from the papers, the ‘five facets’ by Halse and Malfroy (2009) served as an analytical framework. The labelling of these facets was inspired by the intellectual virtues or intellectual qualities described by Aristotle in the *Nicomachean Ethics* (Aristotle, 1999). Thus, from this perspective, the supervisor’s role and supervision must include different facets or qualities. The following discussion focuses on the findings in relation to the values in a quality culture, aiming to bridge the perspectives of quality in doctoral supervision and QM. See Figure 1.

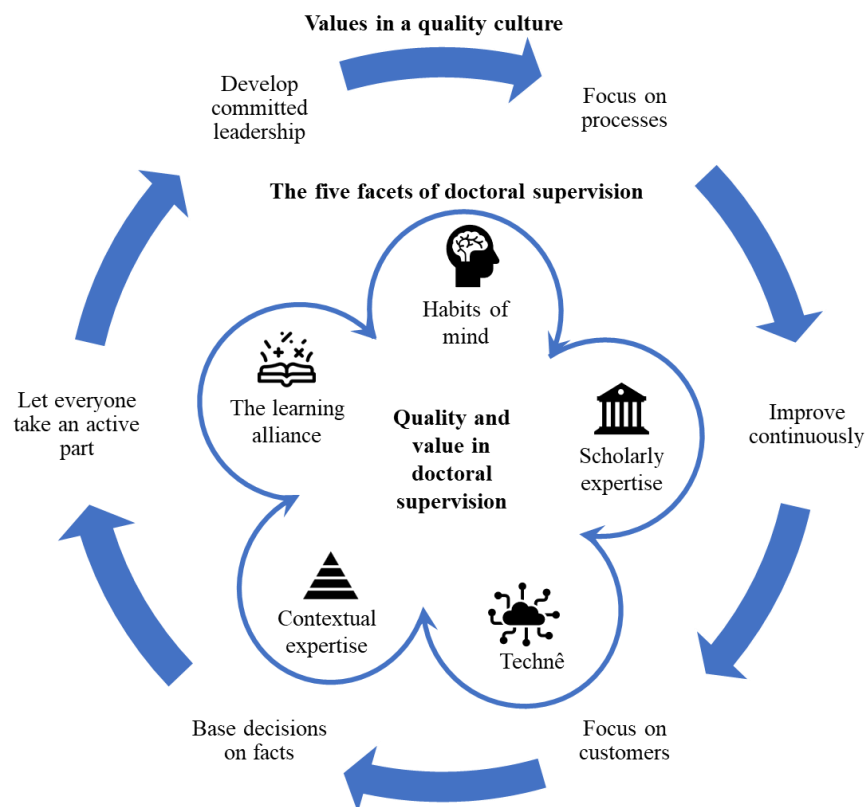


Figure 1. The interaction between the five facets of doctoral supervision and values in a quality culture. Authors' own figure.

The learning alliance involves agreeing on common goals related to the collaboration between the supervisor and the doctoral student by committing and actively participating in decision-making and improvement. Agreed-upon goals are a prerequisite for quality; both organizational goals (Deming, 1986; Juran, 1989; Bergman et al., 2022; Dahlgaard & Dahlgaard-Park, 2006) and personal goals for the doctoral student (Lundahl, 2007) must be clear and stated. *Taking an active part* in the research process is an important step and responsibility for the doctoral student. In a quality culture, employees, in this case, doctoral students, must be able to feel participation, commitment and responsibility to be able to perform well (Bergman et al., 2022). Furthermore, *the learning alliance* reflects the role of the supervisor in guiding the doctoral student and adapting the supervision according to the doctoral student's personal and professional circumstances. This can be compared to the supervisor's role *in focusing on the customer's* (doctoral student's) needs, ensuring that the customer's needs are identified and that they meet or even exceed the needs of the customer (doctoral student) (Bergman et al., 2022).

Habits of mind ('lived knowledge') are both a disposition and a mode of behaviour that involve the capacity to learn and reflect to make decisions in ethically appropriate ways (Halse & Malfroy, 2009). A quality culture includes values, beliefs, and behaviours experienced and built over a long period of time (Schein & Schein, 2017; Harvey, 2024). A doctoral student's supervisor has an important role in the creation of a quality culture. Leaders, acting as role models, need to be aware of how their own behaviours affect the

ability to build a quality culture (Ingelsson, 2013). Supervisors must *develop committed leadership*, be engaged and communicate '*lived knowledge*' to their doctoral students.

Scholarly expertise (theoretical knowledge) refers to the theoretical knowledge acquired through reflection and thinking (Halse & Malfroy, 2009). For supervisors, this means continuous, fruitful participation in the production of knowledge by conducting research, publishing scientific articles and/or providing scholarly critiques that impact thinking or theory. *The continuous improvement* of working methods in terms of scholarly expertise, as well as the performance of supervision itself, is important for achieving high quality.

Technê (craft knowledge) includes supervision not only focusing on technical skills but also emphasizing the capacity to write, speak and communicate; the ability to use resources such as databases; skills in information management; and data analysis and expertise in guiding students in organizing and managing their time (Halse & Malfroy, 2009). Craft knowledge must be adapted to the individual doctoral student's needs to *improve* working methods. Doctoral supervisors also must develop their own knowledge, skills and competence, such as digital learning and digital tools, to be high-quality supervisors who are able to meet the new needs of doctoral students.

Contextual expertise (knowledge of infrastructure) involves knowledge of policies, procedures and requirements for the doctoral process. Halse and Malfroy (2009) referred to this as the 'know-how' to access the infrastructure and resources needed for the doctoral student. The supervisor should support the doctoral student in developing an understanding of key academic *processes*, such as how to update and manage an individual study plan. This includes guiding the student in using a digital system to handle and revise the plan.

This study concludes that a deeper understanding of values in doctoral supervision is needed to further develop quality criteria of supervision that can be evaluated (measured). From the perspective of the five facets, this research proposes the following overarching areas for quality criteria: focus on the doctoral student's needs, improve continuously by reflecting on the supervision and need for training, base decisions regarding supervision on lived knowledge and experience, let the doctoral students take an active part in forming her or his research process, focus on supporting the doctoral students in the academic processes, and develop committed leadership by supporting and guiding the doctoral students. See Figure 2.

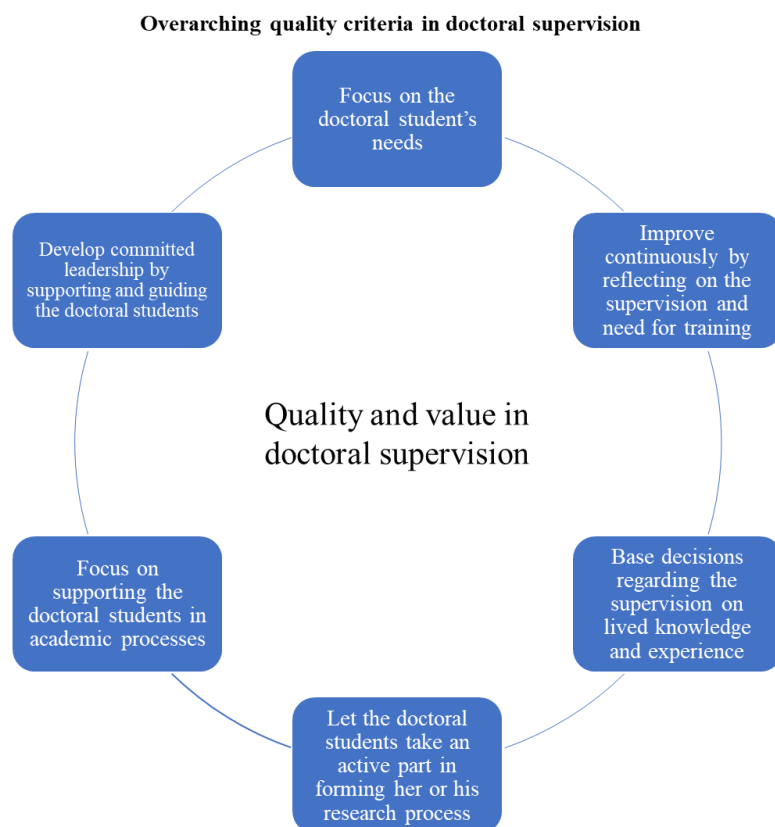


Figure 2. Overarching quality criteria in doctoral supervision. Authors' own figure.

6. Implications

By identifying and assessing the quality criteria of doctoral supervision, it is possible to strengthen both the doctoral student's well-being and self-confidence, as well as the supervisor's reflective capacity and practice development.

Continuous improvement is essential for enhancing the quality of any service; thus, assessing quality and addressing areas for the development of doctoral supervision may serve as effective means of achieving higher standards in doctoral supervision. As an initial step, the authors propose to further examine existing research on how quality in doctoral supervision is defined and measured on the basis of the suggested overarching quality criteria, as well as to study how other universities work to improve quality in doctoral supervision.

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