Lancaster University

Quality Improvement Education and Interprofessional Learning of the Perioperative Team [From Theory to Reality]

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Declaration

This thesis results entirely from my own work and has not been offered previously for any other degree or diploma.

I declare that the word-length of this thesis 54,792 words (prior Viva), conforms to the permitted maximum.

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The philosophers have only interpreted the world, in various ways.
The point, however, is to change it.

— Karl Marx, Theses on Feuerbach

Abstract

Context. Complex societal factors have been obstructing implementation of quality improvement education (QIE) and interprofessional learning (IPL) of perioperative teams. Mistrust between physician anesthesiologist and nurse anesthetist, and payment models that promote competition instead of teamwork, are two of the drivers that shape that picture.

Methodology. In the first part of this critical-realist case study, thematic analysis and activity theory draw a complex picture of how perioperative clinicians perceive QIE, IPL, and technology-enhanced learning (TEL). Following that, critical realist abduction and retroduction logic define one mechanism shaping perceptions of QIE, IPL, and TEL in perioperative context.

Findings. Perceptions of QIE, IPL, and TEL of perioperative teams are intertwined, and perception of one phenomenon can have a transformative impact on perceptions of other phenomena in the context, creating a very dynamic picture. On the other hand, a learning healthcare system (LHS) is not part of the picture since technocentric and managerial visions of LHS promoted by the Institute of Medicine don't support social complexity of QIE and IPL. **The mechanism** shaping complexity of perceptions is: Our world acts as an agglomeration of nested learning systems. On each level, the mechanism is guiding ontological and epistemological transformation of the learning system, through four phases: egocentric ➔ technocentric ➔ ecocentric ➔ holocentric. Those transformations emerge on any level of agglomeration: from cells gathered to create the first multicellular organism to networks of individuals and groups creating professional societies or perioperative teams.

The thesis contributes to knowledge by shedding additional light on how the complex world of perioperative healthcare is structured and how various systems involved in perioperative care interact. On a practical level, the map of QIE, IPL, and TEL perceptions, and insight into one mechanism that is shaping those perceptions, can help perioperative leaders better navigate the transformative changes affecting perioperative teams.

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Dictionary

This thesis focuses on continuing professional development of clinicians in the United States. Therefore, the terminology and concepts discussed are specific to that context and culture.

Key concepts and abbreviations used are:

- **AAAA**—American Academy of Anesthesiologist Assistants
- **ACCME**—Accreditation Council for Continuing Medical Education
- **ACEHP**—Alliance for Continuing Education in the Health Professions
- **ACS**—American College of Surgeons
- **Anesthesiologist assistants (AAs)** are allied health professionals that work under the direction of licensed physician anesthesiologists
- **AANA**—American Association of Nurse Anesthetists
- **ASA**—American Society of Anesthesiologists
- **AT—**Activity theory
- **Continuing Medical Education (CME)** is a uniprofessional approach to continuing education of physicians, built around mainly content-focused didactic formatting. CME had been evolving in CPD.
- **Continuing Professional Development (CPD)** refers to professional development of all healthcare providers. It is a much broader term than CME. It covers all methods we can use to support professional development of individuals, teams, and systems. The CPD term is perceived as more complete and up to date than CME, but CME is still widely used—especially for uniprofessional education of physicians. Therefore, often those terms are used interchangeably or combined as CME/CPD. In this paper, both terms will be used.
- **Crew Resource Management** (CRM) is a set of training procedures for teams that practice high stake task.
- **Enhanced Recovery After Surgery** (ERAS) is a care pathway in many ways similar with PSH.
- **EBM**—Evidence-based medicine
- **IPL**—Interprofessional learning
- **LHS**—Learning healthcare system
- **Nurse anesthetist** is a certified registered nurse anesthetist (CRNA) who has acquired master-level education and board certification in anesthesia.
- **Performance Improvement Continuing Medical Education** (PI-CME) is learning intervention built around quality improvement activities. The linear, 3-stage format is prescribed by the American Medical Association.

- **Perioperative Surgical Home** (PSH) is a surgical care-focused version of medical home. It serves as a patient-centered, team-based, coordinated, practice model encompassing all elements of surgical care—from decision for surgery to complete recovery. It is delivered through interprofessional collaboration among all clinical and nonclinical staff, patients, and their families/caregivers.
- **QIE/IPL** is a view on learning healthcare system perspectives that perceives QIE and IPL as two integrated parts of the same system.
- **Quality Improvement Education (QIE)** is a systemwide educational framework focused on four goals: better care, better health, reduced cost and better professional development (Batalden & Davidoff, 2007). It is rooted in coordinated and continuous efforts of all stakeholders.
- **RCT—**Randomized controlled trials
- **TA—**Thematic analysis
- **TEL—**Technology-enhanced learning

1 *INTRODUCTION & BACKGROUND*

In this introductory chapter, I present the research questions that guide this research, contributions this research makes to knowledge, as well as a brief explanation of the object of the research, research background, and structure of the thesis.

Interprofessional learning (IPL) and Quality Improvement Education (QIE), as well as the **technology used to support them**, are increasingly recognized as important tools to improve performance of U.S. healthcare teams, and address the changes the U.S. healthcare system and the Continuing Professional Development (CPD) system are undergoing (Hager, Russell, & Fletcher, 2008; IoM, 2010; Macy, 2013b; WHO, 2010). The need for change is clear: Healthcare is increasingly delivered by teams, yet healthcare teams are not trained as teams or familiar with team-based quality improvement (QI) methodology. Therefore, their ability to address system changes and the emerging quality improvement needs is limited (Figure 1).

Figure 1. Rising interest in IPL.
Source: CIHC (2008). Used with permission

To address that gap, the Institute of Medicine concluded that professional development of the healthcare workforce and healthcare system should be analyzed and transformed together (IoM, 2015). Widespread adoption of IPL should be part of that process.

The interaction of QIE, IPL, and technology plays a central role in this thesis. The world where we live in, the world where QIE and IPL exists, and QIE and IPL practices are significantly shaped by our interaction with technology. Therefore, QIE and IPL are analyzed from the perspective of a technology enhanced world and technology enhanced learning. As we enter the postdigital era, we experience the contradiction of digital technologies becoming less noticeable yet more essential—just like air is not noticeable until we don't have enough, or it is contaminated.

1.1 RESEARCH QUESTIONS

This research aims to contribute to addressing the gap by finding how QIE and IPL, as well as the technology that is supporting them, are perceived by four professions participating in the perioperative team (physician anesthesiologists, surgeons, nurse anesthetists, and anesthesiologist assistants) and their CPD providers; how that relates to the context that is shaped by numerous strong drivers, like dynamic changes affecting the American healthcare system, conflict between professions over scope of practice, different ontological and epistemological positions different professions have; and finally, how can we improve that? Results of this research will help healthcare leaders better plan implementation of technology-enhanced QIE and IPL in the context of the perioperative team.

That aim will be achieved by answering these three questions:

- How are QIE and IPL and their interaction perceived by four groups involved in perioperative teams (anesthesiologists, surgeons, anesthesiologist assistants and nurse anesthetists) and their CPD providers?
- How do perioperative professionals experience the learning technologies that underpin QIE and IPL?
- What are the implications for perioperative care and future professional development of these findings?

The first two questions are looking mainly for descriptive answers to questions of how: How does it work? How does it look?

The third question: "What the implications are" is calling for an explanation: "Why?" Only if I understand why QIE, IPL, and TEL are perceived the way they are, I will be able to provide deep reflection on implications. Understanding "the why" will give us additional power to improve the system. Therefore, in this research I put special effort into defining the theory that explains the logic behind "Why?"

1.2 CONTRIBUTION TO KNOWLEDGE AND PRACTICE

Context. As the literature review will illustrate, research on education of perioperative teams is very limited, and to the best of my knowledge there is no research that analyzes how QIE, IPL, and TEL interact in a perioperative context. That is at odds with very dynamic changes affecting perioperative teams and need to improve learning programs for perioperative teams. This research addresses that gap by providing insight into how perioperative teams can work and learn better in an era of networked knowledge.

Contributions. More specifically, this thesis contributes to the existing body of knowledge by:

- Showing *how* QIE, IPL, and TEL, as well as their interactions, are perceived by perioperative clinicians and their CPD providers.
- Explaining *why* QIE, IPL, and TEL, as parts of a learning healthcare system, evolve in such a multidirectional manner—by describing one mechanism that guides evolution of learning systems QIE, IPL, and TEL are part of, and
- Providing examples of critical realist theory development process and illustrating similarities between that process and complex clinical diagnosis-making process.

On a practical level, this research contributes to practice by helping perioperative leaders better navigate transformative changes affecting perioperative teams, their learning practices and the socio-political system they are located in. The research empowers them with the map of current perceptions and provides insight into a mechanism that is shaping those perceptions. As result, they will be better-equipped to address the complexity of perioperative, team-based learning.

1.3 ABOUT QIE AND IPL

Before I continue I want to define what QIE and IPL are.

QIE is a systemwide educational framework focused on three goals: better care, better health, and reduced-cost of patient care (Batalden & Davidoff, 2007). Its holistic system-design approach tackles all potential barriers for quality improvement (QI), trying to make permanent systemwide changes. In that context, QI is coordinated with the continuous efforts of all stakeholders—healthcare professionals, patients, researchers, educators, and the public—toward better patient outcomes, better system performance and better professional development.

IPL is a situation "*when two or more professions learn with, from and about each other to improve collaboration and the quality of care*" (CAIPE, 2002).

Knowing the object of the research, research questions, and contribution the research will make, raises questions: What is the context of the research? How does context influence relationship between researcher and research? I will address those questions in the next few paragraphs.

1.4 RESEARCH AND RESEARCHER

Qualitative research I'm doing can be perceived as interpretation of reality created by researcher. That reality is usually complex and socially constructed. Therefore my research is significantly influenced by my ontological, epistemological, and axiological positions, as well as my cultural and professional context (Anderson & Arsenault, 2005; McMillan, 2015). As a researcher I must document those factors—so I can reflect on them, and so readers can get a more complete picture and better assess the findings.

Use of the first person. Qualitative researcher is usually an integral part of research and the research story. As I analyze the world and create new knowledge, I become part of the research story and new knowledge will be marked with my visible fingerprints. In such a case, Caulley (2008), Holloway and Galvin (2016) explain use of the first person as appropriate. Therefore, while writing this thesis I will use the first-person perspective.

1.5 MOTIVATION FOR THE RESEARCH

This research is rooted in these three areas:

1) The need to address the evident knowledge gap,
2) The complexity of the topic that is suitable to PhD thesis, and
3) Personal experience

The need to address the evident knowledge gap is the most important driver of this research. Healthcare delivery in the USA is going through very transformative changes. It is becoming more complex, more team based, and more outcome focused. This is especially noticeable in the context of perioperative surgical care. Yet literature on the education of perioperative teams is scarce. To the best of my knowledge, there is no paper that analyzes perceptions of QIE, IPL, and TEL in the perioperative context. My association with the American Society of Anesthesiologist made that gap obvious to me. The ASA is heavily involved in designing and implementing perioperative surgical home—a team-based perioperative healthcare delivery model that can benefit from QIE and IPL.

Another gap that motivated me for this research is the limited number of practical critical realist research papers—especially in the education of perioperative teams. Critical realism, as a well-developed theory of science, is well suited to address the complexity of perioperative healthcare delivery and education. Therefore, examples of practical critical realist research

can contribute to our capacity to use critical realism, which can help us better understand the complexity of preoperative IPL and QIE.

Complexity of the topic that is suitable to PhD thesis. This thesis focuses on a topic that, in addition to not being well researched, is complex and associated with deep conceptual challenges. For example, interprofessional learning has been high on our list for a long time. The Institute of Medicine's first major paper (IoM, 1972) was titled *Education the Health Team*. Since the paper was published in 1972, we have adopted a huge amount of new technology that significantly changed our life, yet the status of IPL in the perioperative context is still almost the same as it was 47 years ago. It is quite rare, more often on our wish list than on our to-do list. This makes this topic suitable for a PhD thesis research.

Personal experience. Finally, my personal experience makes me interested in this topic. My background is in veterinary medicine. As veterinary student and young DVM interested in TEL, I felt that doctors (at that time I was referring to doctors of veterinary medicine) should be more proactive in addressing the original role of being a doctor. Doctor is Latin for "teacher"; therefore, DVM can be interpreted as "teacher of veterinary medicine." Yet investment in teaching and communication skills of clinicians is relatively limited. This research helped me understand that contradiction and how the dominant positivist and reductionist medical worldview shape medical teaching and learning practices.

1.6 RESEARCHER'S BACKGROUND

This thesis is a result of my doctoral journey at Lancaster University. That journey has been intensive and transformative. It completely changed how I think about ontology, epistemology, and research practice. It is the culmination of a longer, quite eclectic process. Since that history shaped who I am, it is relevant for this thesis.

During my career, as my focus was moving from veterinary medicine, to online education, and then to technology-enhanced CPD of healthcare professionals, my worldview was evolving from positivist, to interpretivist, and finally to critical realist perspective.

Evolution of worldviews. Although for a long time I did not understand the nature of those changes, now I know that I went through these three phases:

1. **Positivism**. My original background is veterinary medicine. I graduated and worked at the Veterinary School University of Zagreb. Therefore, for a long time, positivist ontology—the dominant ontology in biomedical science—was my first and only choice. As a veterinary student and later a teaching assistant, I was heavily involved

in production of content-focused online learning materials. While I was developing those materials, I felt that there must be a better way to learn, yet I didn't have any idea how to do that.

2. **Interpretivism**. I was lucky to be recruited, first to become student and later an online tutor for the Croatian Academic and Research Network (CARNet) E-learning Academy, a program developed in collaboration between CARNet and the University of British Columbia (Kupres & Pašić, 2007). During that time, I became familiar with the basics of learning theory, adopted interpretivist ontology and became aware of how much more I could and should learn. Working for my PhD was a natural next step. I was privileged to be accepted to the Lancaster University Doctoral Programme in E-Research and Technology Enhanced Learning. The program proved to be both challenging and very rewarding.
3. **Critical realism**. During my PhD studies, I worked for the American Society of Anesthesiologists, an organization that is leading the transformation of perioperative practice and perioperative teams. As a result, I decided to focus my research on education of perioperative teams. That is how this thesis started. At the beginning I was favoring the interpretivist worldview. Yet, when I started to analyze my data, I experienced many challenges with getting deeper insight into the complexity of interprofessional learning and finding answers to the question "why?" Things changed when I adopted critical realism and layered ontology. While it is very possible that my inexperience is a reason for at least part of the problems I have been experiencing with the interpretivist ontologies, critical realist ontology is now my worldview of choice.

1.7 RESEARCH CONTEXT AND COMPLEXITY

This research is deeply embedded in the complex context of the American healthcare system. Therefore, as I'm analyzing QIE, IPL, and TEL, it is important to consider features of that context. A few of those features are summarized below.

Healthcare is a clash of titans. From one side, we have the incredible complexity of healthcare and from the other side we have medical reductionism and its attempt to ignore complexity and analyze the world as agglomeration of simple or complicated systems (Heng, 2008; Sala, 2017; Swanson & Widmer, 2018).

Complexity. The exponentially rising number of new treatments, new knowledge, and new technology, is multiplied by the number of professions participating in the perioperative process (some new, some old); and variations in patients; their lifestyles, their behaviors, their wishes, and their beliefs. And all of that is situated in a very dynamic political environment. As a result, it is very complex. There are many things we do not know. Almost any situation has multiple explanations—and can be observed through multiple perspectives.

Positivistic reductionism. That complexity is clashing with medical culture. Medical culture prefers simplicity rooted in positivistic reductionism (White & Willis, 2002). Haidet and Stein (2006) explain that worldview: For every challenge, there is only one solution. Your doctor knows that solution. If the issue is associated with complex social and personal problems, then no, it is not a medical issue.

We have two very different worlds with a huge gap between them. Many issues in healthcare have been left unsolved because of these contradictions. Yet, many attempts to improve the healthcare system are, in essence, attempts to bridge the gap between those two opposites (Heng, 2008). And many of them fail because they can't bridge the gap. The complexity of the healthcare system, the complexity of the society that system is embedded in, as well as the complexity of learning interventions in that society, are not going to be solved by a simplistic approach (Miller, 2000).

The challenge with complexity is that, in addition to being unpredictable, it requires 1) a different mindset; 2) a shift of focus from specific, usually static, phenomena to interactions and connections between various phenomena and activities; and 3) additional tools and methods to comprehend complexity (Bleakley & Cleland, 2015). Consequently, very often we are not well-equipped to deal with complexity. Therefore, we try to address complex challenges with simple linear answers that don't address the complexity of challenges. Robson (2015, p. 34) explained it nicely: "*We recognize there are many complex healthcare challenges; we ask good questions; and then we apply inappropriate linear tools; and we often come up with the wrong answers*."

Resistance toward addressing the complexity of learning has a long history. As Wood and Thompson (1980, p. 163) explained, "*we have ignored what is known about the adult learner and adult learning*" for quite a long time. Instead of addressing complexity, we have been learning new skills to better cope with the increased complexity of the world. But, that does not mean that we have developed. Experience of the world being "too complex" means that our personal or organizational complexity does not match the world's complexity (Kegan & Lahey, 2009). There are two ways to address that mismatch: 1) we can try to reduce the world's complexity, or 2) we can increase our own complexity. That is a tough choice. Increasing personal or organizational complexity requires lots of work, including developing new mental models and worldviews. That may be especially hard for organizations and individuals that do not have sufficient skills in learning theories and practices. Therefore, we are prone to try to reduce the world's complexity. That is not possible. However, while we can't reduce the world's complexity, we can decide to communicate with the world only through the simple concepts we are familiar with. With that, we will create a gap between the services we provide and the emerging needs, but we will feel that we can cope with the complexity. That is why complex concepts like IPL and CPD have been receiving strong pushback. We know that the world's complexity demands them, yet our personal or organizational complexity cannot match the needs. Therefore, we escape back to reductionism and uniprofessional, content-focused learning and CME as modalities that match that mindset.

Complexity of context may look frightening, especially to a reader who is not familiar with the science of complexity. However, complexity of context is not an obstacle but a task that must to be addressed to meet complex situations (Bleakley & Cleland, 2015). On the bright side, we have quite a lot of experience with complexity—whether we come from the biomedical or social science realm. The social science group is usually more eager to engage in researching complexity, yet, there are really few systems that are as complex as the healthcare system (Klein & Young, 2015; Plsek & Wilson, 2001). Therefore, a medical group may have more intimate contact with complexity (Long, McDermott, & Meadows, 2018).

POLITICAL-CULTURAL DISCOURSE

Context. This thesis analyzes phenomena in the U.S. healthcare system, which is shaped by American political tradition, current practices, and culture. The U.S. healthcare system is known for delivering the most expensive healthcare in the world, with many globally known centers of excellence and a leadership role in many areas of innovation. However, on the system level, it may not perform as well as the healthcare systems of the leading developed countries (K. Davis, Stremikis, Schoen, & Squires, 2014; Schneider, Sarnak, Squires, Shah, & Doty, 2017). It is America's largest industry, employing one-sixth of the workforce, with a yearly price tag of $10,739 per person (Martin, Hartman, Washington, Catlin, & The National Health Expenditure Accounts Team, 2018), the biggest single cost for American families (Brill, 2015).

The impact of the high price tag is significant. Recent Gallup research found that in 2018, 65 million American adults did not seek treatment for their healthcare issues because of costs. During the same 12-month period, Gallup estimated that Americans borrowed $88 billion to cover healthcare expenses (Gallup Polls, 2019). As expected, healthcare is one of the most debated national political topics (Lambrew, 2018).

Who is responsible, and who makes decisions? A significant part of the debate revolves around the following question: is the federal government responsible in ensuring that all Americans have healthcare insurance? Gallup Polls (2018) show that support for universal healthcare insurance among Americans has been steadily above 50% since 2016, and steadily above 58% between 2000 and 2009. Unfortunately, Gilens and Page (2014) revealed that in the USA, the economic elite and interest groups representing business interests have significant influence over policies that will be adopted by the government; on the other hand, "the average American appear to have only a minuscule, near-zero, statistically non-significant impact upon public policy" (p. 575). Consequently, steady support for universal healthcare by the majority of the population has not been translated to public policy.

Pace of changes. The Patient Protection and Affordable Care Act (U.S. Congress, 2010), known as Obamacare, was crafted as a compromise solution—between needs to significantly improve the American healthcare system and the inability to adopt a universal healthcare model. Since the adoption of the law, the U.S. healthcare system and the U.S. healthcare CPD system have been going through significant changes. The law is described as a historic reform affecting medicine in the United States so drastically (Manchikanti & Hirsch, 2012) that the best way to describe its current status is VUCA: volatility, uncertainty, complexity, and ambiguity (Mackey & Schweitzer, 2014).

Goals. The three main goals of this reform are (1) improving a patient's healthcare experiences, (2) improving the health of individuals and populations, and (3) reducing healthcare costs per capita. This huge transformation is happening simultaneously, but almost independent of, the healthcare profession's education reform (Macy, 2013a). To bridge this gap, the Macy Foundation team of experts created recommendations called *Aligning QIE/IPL with Clinical Practice Redesign*. These suggestions involve reforming the CPD of healthcare professionals to incorporate interprofessional learning and collaborative practice, revising professional regulatory standards to promote innovative educational models, and including all stakeholders, including patients, families, and communities, in the redesign (Macy, 2013).

Continuation of uncertainty. After Donald Trump was elected president, the pace of reforms has slowed down. However, unsuccessful attempts to repeal the law and successful repeals of parts of the law related to the individual mandate to purchase healthcare coverage have added another level of VUCA (Rice, Unruh, van Ginneken, Rosenau, & Barnes, 2018).

1.8 STRUCTURE OF THE THESIS

The thesis is made of six chapters:

- **In Chapter 1,** I introduce the topic, explain motivation, background, and context for this research, provide my background, and describe the contribution this thesis will make to knowledge.
- **Chapter 2—Literature Review** provides a critical review of literature related to QIE, IPL, and TEL of perioperative teams. With that, I contextualize this research with existing body of knowledge and I provide a broader socio-cultural lens to interpret the dynamics of the analyzed phenomena.
- **In Chapter 3—Methodology** I give a blueprint of methodology used in this course. I explain how the study design evolved, and why a critical realist case study built around thematic analysis was selected as the research framework.
- **In Chapter 4—Findings** I deliver thematic analysis of interviews focused on three phenomena of interest (QIE, IPL, and TEL), as well as phenomena created by interaction of QIE and IPL. The analysis provides descriptive answers to first two research questions: *How* are QIE, IPL, and TEL perceived?
- **In Chapter 5—Discussion** I discuss the relationship between phenomena, how our worldviews influence that relationship. I build on Bawden's (2010) matrix of worldviews to describe mechanism that is shaping the learning systems perioperative

teams are part of. That provides insight into why QIE, IPL, and TEL are perceived in that manner, and answer the last question—what the implications of the findings are?

- **Finally, in Chapter 6—Valuation of the research,** I reflect on the research endeavor, new contributions this research makes to knowledge, as well as the limitations of the research and the need for future research.

2 LITERATURE REVIEW

> It is not enough to know, we must also apply;
> it is not enough to will, we must also do.
>
> *von Goethe (1908, p. 130)*

Key points

- **Quality improvement education (QIE) and interprofessional learning (IPL)** are very interwoven and we can perceive them as two lenses observing the same learning healthcare system (LHS).
- **Medical home** models are built around the concept of networked care—where all healthcare providers, patients, and their families/caregivers work as one well-connected team.
- **In the modern digital and networked world**, any form of experiential learning uses some form of networked learning.
- **Historically, strong societal factors have been obstructing** successful implementation of QIE and IPL. However, the world is changing—it is becoming more collaborative, networked, and quality-focused. New societal drivers are switching the balance.
- **Change is a complex socio-politico-economical process**. Without careful planning, and well-defined benefits, the resistance to change can be strong.
- **Continuing Medical Education (CME) is evolving** from didactic lectures focused on clinical practice, designed for individual clinicians, to Continuing Professional Development (CPD)—a much broader, more holistic approach to professional development of all healthcare professionals (as individuals, teams, and systems).
- **Continuing Medical Education research** is heavily influenced by a quantitative, positivist research approach used in medicine and sponsored by the pharmaceutical industry. Therefore, very often it is at odds with traditions established by social science and educational research.

2.1 INTRODUCTION

The previous chapter—Background—explained the importance of this research.

In this chapter, I will review published literature to present the most important perspectives for implementation of QIE and IPL by professionals involved in perioperative teams, with special focus on technology-enhanced collaborative learning, and cultural and contextual factors.

Implementation of Interprofessional Learning (IPL) and Quality Improvement Education (QIE) is seen as an important part of the transformative changes the U.S. healthcare system is undergoing (IoM, 2010; Macy, 2013b; WHO, 2010). Furthermore, as this chapter will show, IPL and QIE have a very intricate and vigorous interrelation. Therefore, the goal of this literature review is to present the current state of knowledge and how this research fits in that, reflect on strengths and limitations of available literature, identify major debates, and provide insight into relations between those elements.

Big picture. To see the forest as well as the trees, this review will use "the big picture approach." The lines between learning, professional development, and quality improvement activities were artificially created in the siloed, pre-internet world. In our digital and networked world, those lines are becoming increasingly blurred (D. Price, Havens, & Bell, 2012). Therefore, the focus of this thesis will be primarily on how QIE and IPL interact and evolve in this very dynamic, technology-enhanced healthcare environment.

This chapter is made up of six sections. After introduction, the second and third sections are focused on socio-political context and CPD context where QIE and IPL are located. Then the fourth and fifth sections discuss the nature of QIE and IPL and theories used to analyze them. The sixth section provides a brief conclusion.

2.2 CONTEXT: THE U.S. HEALTHCARE SYSTEM AND HEALTHCARE TEAMS

As part of the big-picture approach, it is important to describe the current U.S. healthcare context. The U.S. healthcare system is shaped by a series of very strong drivers. Some of these are:

- **U.S. healthcare CME/CPD research culture** is influenced by positivist tradition (Bunniss & Kelly, 2010). The complex, social nature of the emerging learning and healthcare delivery modalities challenges that tradition.
- **The U.S. healthcare system** is undergoing massive transformation. That process is heavily politicized (Jacobs & Skocpol, 2015; B. R. Knoll & Shewmaker, 2015).
- **The professional development system** is also going through changes, but those changes are not well-synchronized with changes to the healthcare system (Macy, 2013b). QIE and IPL are important parts of those changes.
- **The rise of team-based, patient-centric, and quality-focused healthcare delivery** models as Perioperative Surgical Home has become a noticeable trend (Kain, Hwang, & Warner, 2015; Kain et al., 2014).
- **Empowerment of patients**: From passive recipients of healthcare services, patients have become well-informed team members (LaDonna et al., 2017).
- **Professional identity**: relationships and trust between different professions are cornerstones of successful team-based healthcare delivery. Historically, compensation models that promote competition among team members have negatively influenced that trust (Costanza, DiCowden, & Row, 2014; Porter & Lee, 2013b). Therefore, professional identity has been built primarily around being a member of a specific profession (e.g., anesthesiologist, surgeon, nurse), and less around being a member of a specific team (e.g., Cardiovascular Surgery team)(Meleis, 2016; Molleman & Rink, 2015).
- **Maintenance of certification** modalities, their cost, practices, and their impact on clinical practices and outcomes, are heavily debated in academic, professional, and public circles (Eichenwald, 2015; Nichols, 2017; Rosner, 2018; Teirstein, 2015).
- **Technology** has a huge impact on education, collaboration, and how healthcare data is managed. In our private lives, we live in a networked world, while our professional systems are lagging behind (Cho, Mathiassen, & Nilsson, 2008).
- **Quality improvement education** supporters—headed by the national Alliance for Continuing Education in Health Professions—foresee QIE as an

interprofessional, quality-focused learning system (Diamond, Kues, & Sulkes, 2015).

Those drivers are very interrelated and each of them is going through changes—creating a very dynamic, complex, ever-shifting mosaic. The complexity of that mosaic is significant. Therefore, in the next section I will review some of the practices and pitfalls associated with complexity.

2.2.1 Simple or complicated solutions for complex challenges

The healthcare system—along with the many challenges associated with that system—is very complex. Practice shows that quite often we try to address those complex challenges with simple or complicated solutions. That approach can backfire spectacularly (Poli, 2013). Complicated and complex challenges/systems have completely different natures, and they need very different solutions (Glouberman & Zimmerman, 2002). Table 1 illustrates those differences.

Simple and complicated challenges may need different levels of expertise and effort to be mastered. However, when that level is achieved, we can understand all parts of the system and we can predict the outcome with a high degree of certainty.

Complex systems/challenges are a different story. They are constantly changing. Therefore, we can't be certain about the outcome, nor can we gain a complete understanding of that ever-changing system. We can't control complex systems. The best we can do to influence complex systems is feel them and learn to "*dance with them*" (Meadows, 2002). On the other hand, a positive feature of complex systems is that they have the adaptive/creative capacity to learn from experience and evolve over time (Bleakley & Cleland, 2015). Therefore, a complex system is learning system.

Simple Challenge	Complicated Challenge	Complex Challenge
Following a Recipe	**Sending a Rocket to the Moon**	**Raising a Child**
The recipe is essential.	Formulae are critical and necessary.	Formulae have a limited application.
Recipes are tested to assure easy replication.	Sending one rocket increases assurance that the next will be OK.	Raising one child provides experience but no assurance of success with the next.
No particular expertise is required. But cooking expertise increases success rate.	High levels of expertise in a variety of fields are necessary for success.	Expertise can contribute but is neither necessary nor sufficient to assure success.
Recipes produce standardized products.	Rockets are similar in critical ways.	Every child is unique and must be understood as an individual.
The best recipes give good results every time.	There is a high degree of certainty of outcome.	Uncertainty of outcome remains.
Optimistic approach to problem is possible.	Optimistic approach to problem is possible.	Optimistic approach to problem is possible.

Table 1. Raising a second child
Differences between simple, complicated, and complex challenges/systems
(Glouberman & Zimmerman, 2002, used with permission).

Complex systems are the default. All biological and social systems we are dealing with are complex. On the other hand, complicated systems, as systems that are highly defined and very precise—are extremely rare (Poli, 2013). Unfortunately, due to the positivist/machinist worldview and desire to deliver decisive solutions, very often complex systems are analyzed as complicated systems. Furthermore, medical science uses various methods to close an open system and detach it from context, so the complexity of the system can be reduced or eliminated and the system can be better analyzed (Poli, 2013). The challenge with that approach is that the analyzed systems are significantly different than complex systems that exist in the "real world."

Challenges with researching a complex issue lead me to the following topic—research culture.

2.2.2 U.S. healthcare CME/CPD research culture

Research culture. Cultural elements have significant impact on how the areas this thesis investigates (healthcare learning and quality improvement) are practiced and analyzed in the U.S. healthcare CME/CPD literature. CME/CPD healthcare education literature historically has been reliant on context-free, predominantly randomized controlled trials, and positivist and quantitative methodology used in medical research (Bunniss & Kelly, 2010; Donald E. Moore, Bennett, & Mann, 2012). On the other hand, social science education research usually uses context-specific qualitative methods and has a strong theoretical basis. Since qualitative and quantitative research traditions can be viewed as separate cultures marked by distinct norms, values, and beliefs, as well as skepticism toward each other (Burns, Macdonald, & Carnevale, 2018; Mahoney & Goertz, 2006), that contradiction can cause challenges. In the U.S. CME/CPD context, lack of communication between those two cultures can be troublesome, with common misunderstandings.

Numerous clinical practitioners argue that attempts to use evidence-based medicine (EBM) while addressing complex issue builds false confidence; it does not enhance objectivity, but obscures the subjective elements that are associated with all types of human research (Berwick, 2013; Goldenberg, 2006).

Evidence-based medicine is rooted in positivism (Brives, Le Marcis, & Sanabria, 2016). Simultaneously, the positivistic view of scientific methodology has been challenged over the past half century in two respects (Goldenberg, 2006):

1. Our observations and conclusions are heavily influenced by our personal and societal background, theories, knowledge, and values. Therefore, even in an ideal situation they cannot deliver an absolute picture of the world (A. M. Clark, 1998)
2. The link between "the evidence" and selected theories is never absolute (Duhem, 1991)

Ignoring the context? Donald Berwick revealed that although rigorous randomized control trials can neutralize variations and deliver answers to very specific questions, they cannot be used to assess complex activities like perioperative teams or QI collaboratives. We cannot remove variations without ignoring the context. Dr. Berwick (2013, p. 112). Berwick explains: "*We need evidence... We can't allow subjective hopes, wishes, and dreams to pretend to be truth when unforgiving nature is at work, or we will...do harm. But the harm is equal if we treat a very complex world as if it were simple, if we treat each other as less than whole people and complex systems as simple and separate from us, and thereby reduce our capacity to learn, to converse, to explore, and to grow.*"

Eating soup with a fork is the metaphor Berwick (2013, p. 107) uses to illustrate the impact of mismatch between research topic and methodology. Arguably, that quite common mismatch has been influencing the outcome of CME/CPD research and practices. A significant number of papers have attempted to analyze very complex social phenomena through the lens of one-dimensional, context-free quantitative research. As a result, the research did not deliver sound, actionable data, and CME/CPD providers have been forced to "improvise." For example R. D. Fox (2012, p. 192) explains that CME practices are "*primarily a function of mimicry, rather that investigation and systemic learning,"* and *"isolated findings from small, poor studies become justification for adoption of 'innovative' educational methods*."

Dramatic shift. The aforementioned divide can explain debate over the change from the term CME to CPD. The change reflects a significant cultural, ontological, and epistemological shift in the ways majority stakeholders envision lifelong learning of healthcare professionals (Karle, Paulos, & Wentz, 2012). It is a move from formal uniprofessional content-focused didactic lessons, toward an interprofessional team, student, and outcome-focused learning system. The process formally started in 1993 when the UK Standing Committee on Postgraduate Medical Education proposed the term CPD, reasoning that the CME approach was no longer sufficient to cover the complete development needs of modern health professionals (SCOPME, 1994). Although we now know the direction in which we are going, the debate is far from settled. I will be further discussing this issue in the section titled Transformation of healthcare CPD (p:44).

Table 2 below illustrates scale and complexity and contradictions associated with that change. The change affects a significant number of our activities. Epistemological differences between literature review approaches in CME and social science as described by Singh, McPherson, and Sandars (2014) are added under epistemology.

Clash of cultures		
Quantitative research		Qualitative research
Clinical science		Social, education
CME	⇔	CPD
Reductionism		Complex, critical thinking
Uniprofessional		Interprofessional
Individuals		Teams, communities, systems
Content-focused		Student and outcomes-focused
Epistemology: • Learning is a "treatment" • Follow the procedures • RCT as the gold standard • What is out there? • Backward-looking		Epistemology: • Learning is a complex process • Develop an intellectual argument • A wider range of evidence • What is going on out there? • Forward-looking

Table 2. Clash of Cultures

This thesis analyzes phenomena that are deeply embedded in the social, cultural, economic, technological, and educational mosaic of the U.S. healthcare system. Therefore, context-free quantitative RCT and rule-driven meta-analysis can be of limited use.

In the next section I will discuss political context, and how it is shaping American healthcare and the work of perioperative teams.

2.2.3 Political context

The U.S. healthcare environment is going through massive, complex, dynamic changes. The drivers of those changes are multiple and strong. For example, the analysis provided by the Commonwealth Fund, a U.S.-based private foundation supporting independent research on healthcare practices, showed that while the U.S. has the most expensive healthcare in the world, the system does not outperform other industrialized countries on most measurements (K. Davis et al., 2014; Schneider et al., 2017).

As Table 3 below illustrates, the scale is significant: U.S. healthcare costs are 50% more than the second-most-expensive system in this study—Switzerland—and 2.5 times more expensive than the best-performing county in this research—the UK. As a result, the Institute of Medicine reports that all Americans (including wealthy ones) suffer from more illnesses and injuries and have shorter life spans than people in other high-income countries. That underperformance is happening despite well-described ways to address those issues and the enormous healthcare costs (IoM, 2013c).

COUNTRY RANKINGS

Top 2*
Middle
Bottom 2*

	AUS	CAN	FRA	GER	NETH	NZ	NOR	SWE	SWIZ	UK	US
OVERALL RANKING (2013)	4	10	9	5	5	7	7	3	2	1	11
Quality Care	2	9	8	7	5	4	11	10	3	1	5
Effective Care	4	7	9	6	5	2	11	10	8	1	3
Safe Care	3	10	2	6	7	9	11	5	4	1	7
Coordinated Care	4	8	9	10	5	2	7	11	3	1	6
Patient-Centered Care	5	8	10	7	3	6	11	9	2	1	4
Access	8	9	11	2	4	7	6	4	2	1	9
Cost-Related Problem	9	5	10	4	8	6	3	1	7	1	11
Timeliness of Care	6	11	10	4	2	7	8	9	1	3	5
Efficiency	4	10	8	9	7	3	4	2	6	1	11
Equity	5	9	7	4	8	10	6	1	2	2	11
Healthy Lives	4	8	1	7	5	9	6	2	3	10	11
Health Expenditures/Capita, 2011**	$3,800	$4,522	$4,118	$4,495	$5,099	$3,182	$5,669	$3,925	$5,643	$3,405	$8,508

Notes: * Includes ties. ** Expenditures shown in $US PPP (purchasing power parity); Australian $ data are from 2010.
Source: Calculated by The Commonwealth Fund based on 2011 International Health Policy Survey of Sicker Adults; 2012 International Health Policy Survey of Primary Care Physicians; 2013 International Health Policy Survey; Commonwealth Fund *National Scorecard 2011;* World Health Organization; and Organization for Economic Cooperation and Development, *OECD Health Data, 2013* (Paris: OECD, Nov. 2013).

Table 3. How the U.S. Healthcare System Compares Internationally
(Source: K. Davis et al., 2014. Used with permission of the Commonwealth Fund).

Performance trends. Figure 2 illustrates how age-adjusted mortality rates per 100,000 population have been falling steadily in the 34 Organization for Economic Cooperation and Development (OECD) countries and in the U.S. The U.S. was noticeably above the OECD average. However, in 1986, after five years the Reagan administration was promoting neo-liberal policies (George, 1999; Rasmus, 2006), U.S. healthcare started underperforming in comparison with average of other OECD countries. It moved from having 55 fewer deaths/100,000 population than the OECD average—to 49 more than average. Impact of that difference of 104 (55+49) deaths/100,000 population, calculated on a level of the American population of 327,147,066 (census.gov, 2018) is 340,231 lives/year. To put that in perspective, total U.S. casualties in the World War II were 405,399 (DeBruyne, 2018).

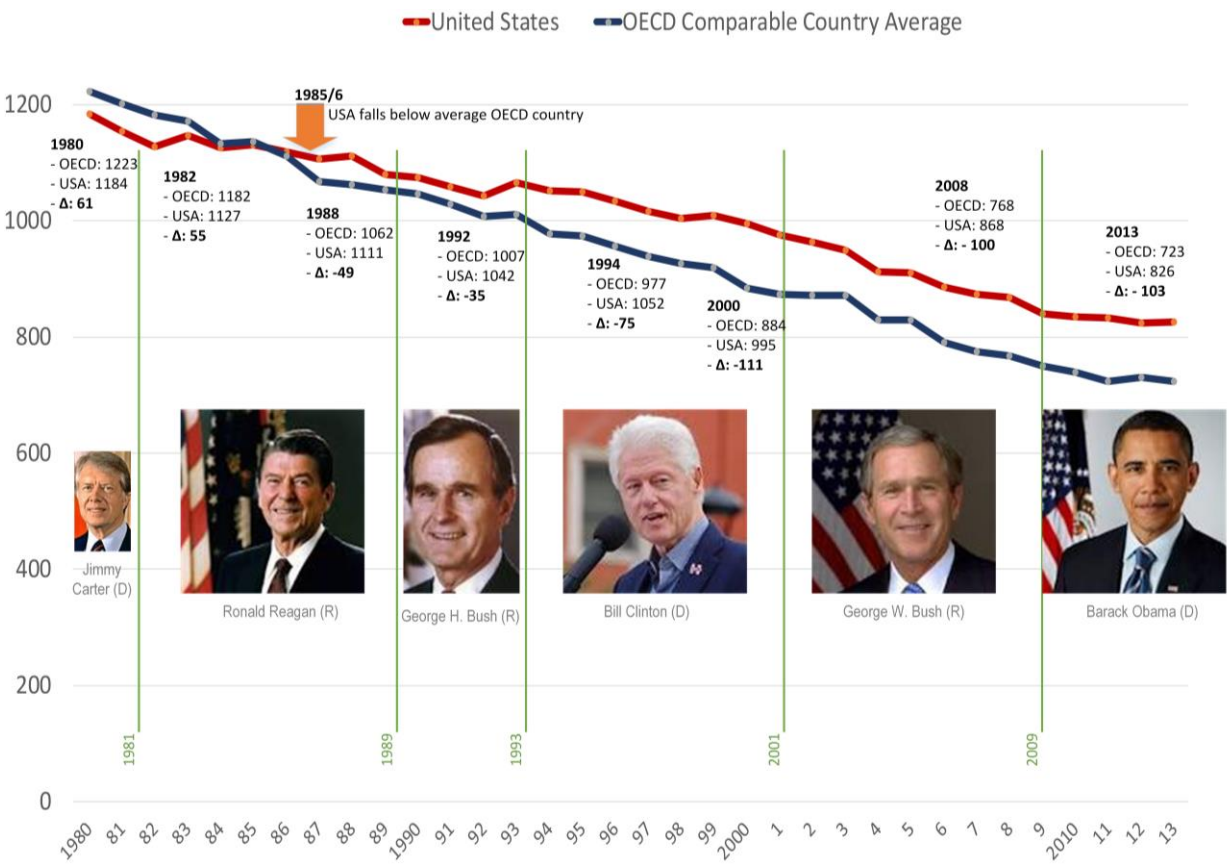


Figure 2.Trends in age-adjusted mortality rate per 100,000 population —in the U.S. and comparable country average, 1980-2013. Mortality rates have been falling steadily in the U.S. and comparable OECD countries. 1986 was the year when U.S. started underperforming in comparison to OECD average. Data source: healthsystemtracker.org (2017). Images used are in public domain (Wikipedia).

Cost trends align with that performance gap. Analysis of Schneider et al. (2017) shows that since the 1980s, the cost of the U.S. healthcare system has been increasing significantly faster than in other developed countries. As a result, all developed nations included in the research invest between 9% and 11.4% of GDP in healthcare, while U.S. healthcare consumes 16.6% of GDP as Figure 3 illustrates.

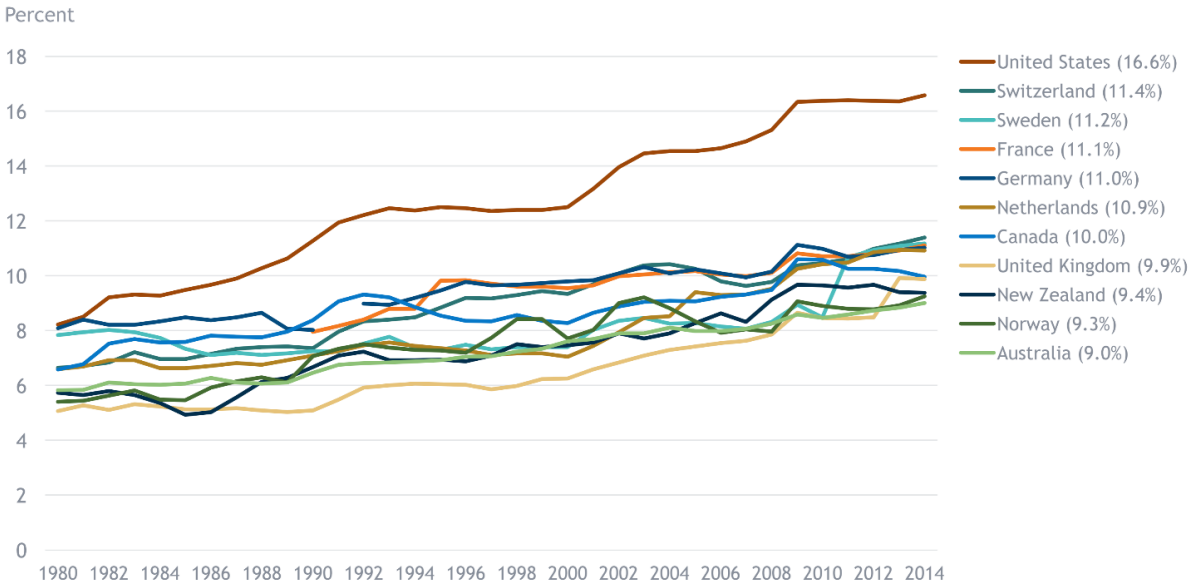


Figure 3. Healthcare Spending as a Percentage of GDP, 1980–2014.
Source: Schneider et al. (2017). Used with permission.

Tolerance for this performance gap of the U.S. healthcare system is rooted in a deep ontological divide**.** From one side of the divide we have the view of healthcare as a very complex system that is essential for the livelihood of all citizens. That view promotes a coordinated, systematic approach to healthcare, with a goal of universal health coverage for all Americans. On the other side we have perception of healthcare as a quite simple, or merely complicated, system focused primarily on acute care and downplaying prevention (Marvasti & Stafford, 2012). Through that lens, healthcare is reduced to a commodity that consumers can purchase when they are sick. While such a simplistic approach to healthcare is far from reality, in politics, and public arena it is very popular.

That neo-liberal view assumes that decentralization, individualism, and a free market created by deregulation and privatization are essential for success of the healthcare system. It assumes that healthcare should follow the traditional business mindset—where the goal of a business is to create a customer (Drucker, 1975; Levitt, 1960). In the healthcare business the customer is a patient, a sick person. Since that business logic of creating a customer/patient "*by advertising, by salesmanship, or by inventing something new"* (Drucker, 1975, p. 37), conflicts with the healthcare needs of the American population, cost-wise and health-wise it is a severely underperforming system (Schneider et al., 2017). On the other hand, huge profits fuel strong lobbying, propaganda, and political machinery that helps maintain the system as it is (Geyman, 2018).

To illustrate the financial argument, yearly cost per capita of healthcare in the U.S is on average $5,103 higher than the same service in the UK (K. Davis et al., 2014). On the U.S. population level, that is an extra expenditure of $5,103 per person times a population of 327,147,066 = $1.7 trillion. Calculating over the lifetime of an individual it is $5,103/year X

79 years = $403,137. So, for healthcare, each American pays on average $403,137 more than her colleague in the UK. Obviously, numerous stakeholders have strong financial motivation to keep the system as it is.

ACA. To improve the U.S. healthcare, the U.S. government adopted the Affordable Care Act (ACA), also known as Obamacare, on March 23, 2010. The law is described as *"the most sweeping legislation affecting every individual in the United States in the last century."* (Diaz, 2015, p. 81).

Impact. Knowing the important role healthcare has in the lives of individuals, as well as society, it is fair to say that this reform is profoundly affecting everybody in the U.S.: healthcare providers, patients, government, and U.S. society in general. For example, it is estimated that in the first three years of the ACA, 50,000 patient deaths were prevented and $12 billion was saved (ahrq.gov, 2015; Kessler, 2015).

Dynamic of national healthcare politics and practices shapes the situation of (inter)professional politics, where conflicts and financial drives are equally noticeable. That is focus of the following section.

2.2.4 Professional politics

Strong political-economic and social factors shape CPD of healthcare professionals in the U.S. (Balmer, 2013; Cervero & Moore Jr., 2011) and have obstructed QIE and IPL for decades (Hayes, 2012). As history shows, those factors (pay-for-service, siloed guilds, and accreditation systems, for example) may have a stronger impact than professional and educational factors.

Interprofessional relationship. This research is done in the context of the perioperative care team (surgery and anesthesia professionals). The literature suggests that due to rivalry between professionals or specialties, learning and change in networked practices may be difficult (Norman, 2013). That may be very noticeable in this context, where one very relevant issue is a long and intense debate between physician anesthesiologists and nurse anesthetists over nurse scope of practice (Hayes, 2012). Nurse scope of practice defines procedures nurses are permitted to undertake in keeping with the terms of a professional nursing license. The primary debate is over actions nurses can take without physicians' supervision.

In addition to the main factor—patient safety—nurse scope of practice directly influences positions and payment of physician anesthesiologists and nurse anesthetists, making it a strong politico-economical factor (with a huge impact on social capital). For example, Johnstone (2015) showed that, in addition to high membership fees ($665-plus memberships in local state societies), one of the main reasons cited by anesthesiologists for not joining the American Society of Anesthesiologists (ASA) was related to the ASA's policy toward nurse

anesthetists. What is especially interesting, the article showed that while some non-member anesthesiologists think the ASA is working too closely with nurse anesthetists, others think it is not working closely enough.

Socio-economic, professional identity drivers and changes in roles and degrees bring a few additional layers of complexity that influence the relationship between anesthesiologists' and nurse anesthetists' professional groups.

For example, from a socio-economic perspective:

- Physicians start their anesthesiology career in their early 30s or later, after 12 years of expensive and highly competitive higher education (4 years undergraduate, 4 years graduate and 4 years residency), and with average student debt of $182,000 (Grischkan et al., 2017) and where 10% of graduates have debt of $300,000-plus (AAMC, 2014).
- Fee-for-service is still the dominant payment method in the healthcare setting (Pearl, 2017; Schroeder & Frist, 2013). In that context, if somebody else provides a similar service as you do, that person is a competitor who may reduce your income (and your ability to repay your student debt).
- Debate about nurse anesthetists' role in the anesthesia process (scope of practice) contributes to disagreements between physician anesthesiologists and nurse anesthetists (Hayes, 2012). In most states, nurse anesthetists work under supervision of anesthesiologists. However, 17 states do not have that safety requirement. In addition to being a patient-safety issue (Hansen & Philp, 2014), that is perceived as unfair competition, because nurse anesthetists' certification requires six years less education. Since education of nurse anesthetists is evolving to all-doctorate programs by 2022 (COA, 2007)—we may expect this debate to continue.

On the other hand, recent political-economic and social factors started changing that power dynamic. Rising costs of U.S. healthcare, as well as quality and patient safety issues (Berwick & Hackbarth, 2012; K. Davis et al., 2014), have triggered massive changes in the U.S. healthcare system. For example, the fee-for-service payment model is being replaced by value-based-care (Porter & Lee, 2013a). In that model, healthcare teams are rewarded for doing good work, and penalized for poor performance. Therefore, perception of other professions has shifted from being competitors in the race for the same sum of money, to being valuable members of your high-performing team. The logic behind that model is: your team and team members will be properly rewarded only if the team delivers high-quality care. Therefore, if your college improves performance of the team—your team and you will benefit.

In the sections that follow, I will review how healthcare delivery models, as well as roles and academic degrees of perioperative professionals, are contributing to that dynamic.

2.2.5 Roles and academic degrees

The evolution of roles and academic degrees in healthcare provides insight into the nature and structure of healthcare teams. For example:

- They reflect how public and peers perceive individuals and professions.
- They involve a social contract that defines how healthcare teams work and hierarchical relationships inside the team.

The situation is rapidly changing. For example, nurse anesthetists are becoming doctors, teams are being reorganized, and interprofessional collaboration is becoming standard. Therefore, insight into historical context can be valuable.

Roles and qualifications of healthcare providers have been evolving throughout history, from priests, shamans, and healers, through physician-centric, patient-centric, and team-based models, and finally to networked care. Different individuals and organizations may be at different stages (physician-centric, patient-centric, team-based, networked care). The stages are described below:

Physician-centric. During late 18th century, we started understanding the mechanism of diseases, and hospitals emerged as places where patients were treated (Wall, 2012). The authority of the healer started to increase and the economic, social, and political distance between healers and patients began to grow. Therefore, healers started to be recognized as teachers/doctors (lat. doctor, oris, m. teacher) of medicine. With the increasing amount of required knowledge and tools (pharmacy and surgery, for example) the gap between what physician and patients know has also been on the rise. Furthermore, healthcare has become more complex, more industrialized and disease-focused. The widespread belief was that patients were too ignorant to make or participate in medical decisions (Rose, 1998). Therefore, presenting details about limitations and risks of the interventions could not only be a time-consuming endeavor, it could undermine the patient's faith in the proposed therapy. That resulted in a very physician-centric model, where doctors would make decisions, and patients (and support staff) would silently comply with the instructions.

Patient-centered. Today, the doctor-dominated, one-sided model is being replaced with a patient-centered alliance built upon cooperation between the doctor and the patient. In that alliance, the doctor is not only the technical expert, but also the teacher and coach helping patients understand and manage their role in the healthcare process and cope with strong emotions and dilemmas. Patients, on the other hand, can become experts in managing their

chronic disease (Tattersall, 2002). Therefore, mutual respect, active participation of all parties, and shared decision-making is replacing patient passivity (Kaba & Sooriakumaran, 2007). The doctor serves as a teacher-expert who is the connection between the world of medicine and the patient's experiences and needs.

My recent visit to a doctor was a good example. After thoughtful explanation of the issue and addressing my questions, my doctor handed me a piece of paper with handwritten keywords. "*Here is a list of things you can Google to learn more about the things we discussed today*," he said. "*Prepare questions for the next visit*."

Team-based care has evolved as an advanced model of the patient-centered approach, where the healthcare team and patients work together to deliver optimal patient-centered care. Goldberg, Beeson, Kuzel, Love, and Carver (2013) describe it as the most important, practice-transforming tool used to provide patient-centered care. Lin, Schillinger, and Irby (2014) convincingly argue that to address extensive changes needed in practice redesign and medical education, a "share the care" paradigm is necessary. "Share the care" means empowering teams made of clinicians, non-clinicians (educators, pharmacists), and patients to share responsibility—so each team member can contribute to his or her maximum potential. That paradigm includes a cultural shift from "I" to "we" (Ghorob & Bodenheimer, 2012). "I" stands for the lone doctor-with-the-helpers model, where the clinician makes all decisions, assumes all responsibility and delegates tasks to other team members—helpers. On the other hand, "we" stands for sharing responsibilities, not just tasks. "We" also stands for team-based learning where the doctor, in addition of consulting and coaching patients, mentors team members.

Networked care. Finally, networked care, or technology-enhanced team-based care, is where all participants—healthcare providers, patients, and their families—collaborate on healthcare delivery. It is increasingly seen as the model of the future (Bornkessel, Furberg, & Lefebvre, 2014; Gaugler & Kane, 2015). It uses digital social media platforms and networks to connect patients and healthcare providers, empowering patients to be more involved in their personal health activities, and driving providers to improve the quality of their service. That aligns well with needs of person-centered care, where the full complexity of person getting care—as well as partnership with interprofessional healthcare teams and society—is taken into account (AGS et al., 2016; Ekman et al., 2011).

Patients are vocal about those needs. They perceive lack of communication as the biggest issue. For example, the average healthcare user spends 52 hours a year reading online healthcare information and networks, and only one hour talking with a physician (Makovsky Health, 2013). As a result, most patients experience challenges using available health information.

That is a huge opportunity. A significant body of evidence shows that engaged patients have better healthcare experiences and better health outcomes (Hibbard & Greene, 2013). Networked care can engage patients and empower them to make better-informed decisions.

A few issues associated with networked care, which should be addressed in advance, are confidentiality, privacy, and liability. If not addressed properly, they can become a minefield of legal issues (Moses, McNeese, Feld, & Feld, 2014).

Mayo Clinic is a good example of networked care. They created a Social Media Network because (mayoclinic.org, 2018):

> *At Mayo, we believe individuals have the right and responsibility to advocate for their own health, and it's our responsibility to help them use social networking tools to get the best information, and connect with providers as well as one another.*

The migration toward networked care aligns well with what K. E. Allen and Cherrey (2000, p. 1) described 18 years ago: "*Two major shifts occurring in the world are having a significant effect on how we work together, influence change and lead our organizations. The first shift is from a world of fragmentation to one of connectivity and integrated networks. The second shift is from an industrial to a knowledge era...All of us need to explore new ways of working that keep pace with this networked knowledge era.*"

That is exactly what this thesis is doing—exploring how perioperative teams can work and learn better in an era of networked knowledge.

2.2.6 Medical home

Evolution of roles, and a shift from a fragmented world to one of connected networks, leads us to another trend—medical home. Medical home is a team-based healthcare delivery model that uses collaboration to deliver high-quality, comprehensive, and continuous care. Medical home is a microsystem made up of groups that take part in immediate delivery of care and interact directly with patients. The structure includes physicians, nurses, pharmacists, and other groups that support the microsystem, like laboratory, IT, and leadership professionals (Batalden, Nelson, Edwards, Godfrey, & Mohr, 2003).

For surgical care, the ASA launched a specific version of medical home called perioperative surgical home (PSH). M. Schweitzer, Fahy, Leib, Rosenquist, and Merrick (2013, p. 58) describes PSH is a collaborative, interprofessional and "*team-based system of coordinated care that guides the patient throughout the entire surgical experience*," from diagnosis to recovery (Figure 4).

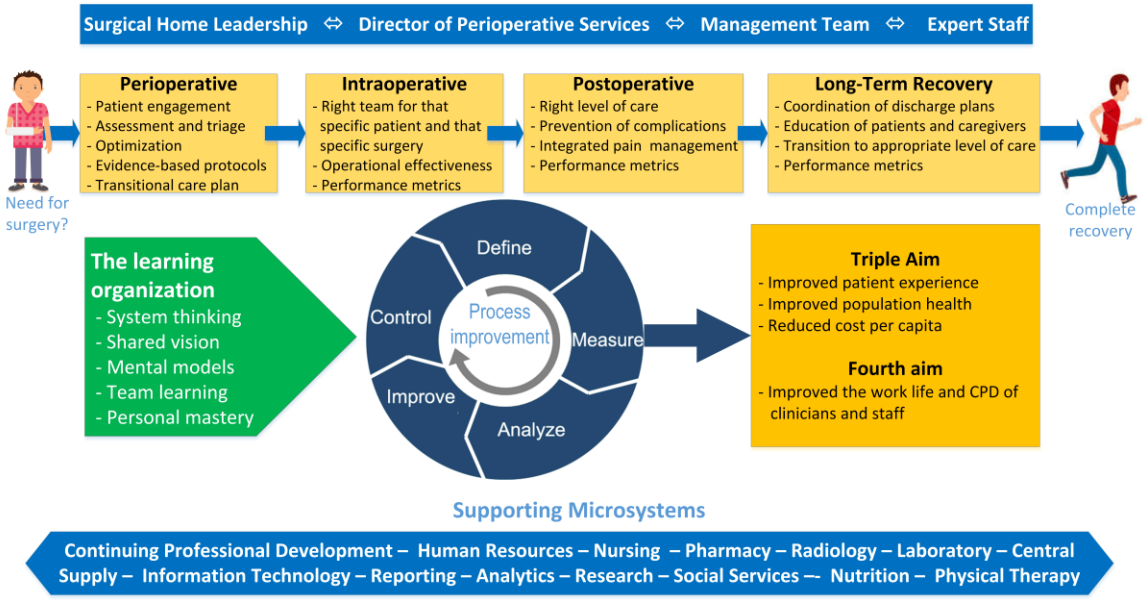


Figure 4. Perioperative Surgical Home
(Mike Schweitzer, Kain, & Cole, 2014).

Where did the medical home idea start? What can we learn from history? Since PSH is a new version of medical home, we can learn a lot from the history of medical home. Patient-centered medical home was first introduced by the American Academy of Pediatrics (AAP). In 1974, the AAP Council on Pediatric Practice proposed a policy statement titled "*Fragmentation of Health Care Services for Children*" (AAP, 1974). The policy statement was not accepted, but the document clearly indicated that 1) fragmented care is inefficient, expensive, and can be harmful for health, and 2) medical home is an important tool to address fragmented care (Sia, Tonniges, Osterhus, & Taba, 2004).

Same challenges. During the following decade, as the medical home concept gained greater recognition, challenges with implementation became noticeable. B. Moore and Tonniges (2004) explained that three major barriers were 1) unfamiliarity of pediatricians with the medical home concept; 2) communication and coordination between professionals; and 3) reimbursement for new tasks associated with medical home. Kain et al. (2014) reports that the same challenges face implementation of PSH today. Therefore, it is fair to assume that insight into medical home implementation can enhance implementation of PSH.

Evolution of concept. It is interesting to notice how the term medical home has evolved since 1974. At first, it was envisioned as a physical place that stores all medical information relevant to that patient (i.e., centralized medical records). Between the 1960s and the 1980s, gaining access to healthcare data was a bottleneck and the medical home model then provided a workable answer to that challenge. As we were improving access to healthcare data, it become obvious that consolidated healthcare data is just the first step; better coordination among healthcare professionals, families, and patients is needed. That is especially noticeable now, when technology can give instantaneous access to needed medical information.

Therefore, the term medical home now means a comprehensive, team-based healthcare delivery system, where well-coordinated interprofessional healthcare teams, in partnership with patients and their families, deliver healthcare that is accessible, coordinated, comprehensive, compassionate, culturally effective, cost-effective and, most importantly, centered on the patient and the patient's family (AAP, 2002; Sia et al., 2004).

That evolution is in many ways like the evolution described under roles and degrees. If we assume that communication is enhanced by digital media, it leads to networked care. The table below illustrates that similarity.

Model	Past		Now		Now		Future
Medical home	Fragmented	→	Physical place with all relevant medical info	→	Team-based	→	**Networked care**
Roles in healthcare teams	Physician-centric	→	Patient-centric	→	Team-based	→	

Table 4. Evolutions of healthcare team roles and medical home –different origins, but the same end.

PSH collaborative. ASA initiated the PSH learning collaborative (ASAHQ.org, 2014a) to bring together healthcare organizations from across the U.S. to work on development, testing and implementation of the PSH model. PSH learning collaborative provides face-to-face and online networked and collaborative learning opportunities. Each collaborative is a time-limited (2 years) community of practice, where many institutions work together mainly via live, phone and web conference meetings. Learning Collaborative 1.0 was launched on July 1, 2014, and on each following even year, a new collaborative started. The upcoming one is scheduled for 2020 (Ferrari, Pease, Stier, & Schweitzer, 2018).

Opportunity? The existing learning collaborative framework can serve as a springboard for a more open, continuous, and technology-enhanced community of practice. More intensive use of asynchronous online collaborative tools (social media) will be the main addition to the existing model. Until August 2015, the ASA didn't have technology that could support such a community. Between 2016 and 2018, significant efforts were invested in customizing and learning about the framework, so a collaborative learning community could be properly supported. ASA has the technology and intention in place. Therefore, at this moment, the critical elements needed are people. This is a social endeavor, and for successful outcomes we need an engaged and properly supported learning community. This thesis will research what PSH professions think about that possibility.

PSH and IPL. Since effective IPL enables effective collaborative practice (WHO, 2010) we can assume that IPL may be an important part of this interprofessional model. PSH has the same three goals as the national healthcare transformation (ASAHQ.org, 2014b): 1) improving healthcare delivery (patient experience); 2) improving health; and 3) reducing cost. That

suggests that the stated goal of the Macy (2013b) conference of *Aligning IPL with Clinical Practice Redesign* and reforming CPD to incorporate IPL can be achieved in this context.

However, there are many challenges ahead of that goal and QIE/IPL in the U.S. perioperative context is in its early stages.

ASA's cautious approach to IPL may reflect the extensive efforts needed to make it happen and mistrust between physician anesthesiologists and nurse anesthetists described earlier. In addition to that, the Institute of Medicine (IoM) workshop on IPL and collaboration has recognized that successful implementation of IPL requires these essentials: leadership from the top, extensive planning, repeated IPL experience through the educational continuum, focus on real-life work, utilization of new technologies, and strong faculty development (IoM, 2013b). Insufficient faculty development and lack of (repeated) IPL experiences seem to be the biggest obstacles at this moment.

CME/CPD OF PERIOPERATIVE TEAM IN THE U.S.

In the previous section I explained socio-economic and political processes that shape the professional and educational landscape of healthcare professions. In this section I will describe how education is changing in that very dynamic context. I will start with a reflection on more general technology-related changes, which share many similarities with processes affecting our society in general. The focus will continue to be on topics that are specific to education of healthcare professionals in the U.S.

2.2.7 Organizational and learning technology context

LMSes for teams. Learning and maintenance of certification practices are influenced with available technology and how that technology is used. Thus far, a majority of CPD providers rely on Learning Management Systems (LMS), which have limited functionality. Such LMS systems are built around a combination of SCORM modules + files + quiz + survey + certificates, and often lack support for collaborative education (Cook et al., 2018; Harris, Sklar, Amend, & Novalis-Marine, 2010). They can address needs of content-focused education, but have limited ability to address needs of collaborative or networked learning. The ASA's leadership has recognized that gap, and the ASA implemented a new Moodle-based LMS—Totara—in 2015. Totara comes with all the collaborative features of Moodle. Therefore, it was a big change. In addition, Totara provides strong support for learning plans and

organizational structure/hierarchies.[1] Through the Totara hierarchies' framework, the ASA can assign specific competencies and courses to specific roles in a team/organization. That feature may be of value for interprofessional programs—where different professions will use different learning paths.

This research is located in the context of the perioperative team. Therefore, in addition to learning technology and practices used by anesthesiologists, the technology and practices used by nurse anesthetists, surgeons, and anesthesia assistants will have an impact. The American Association of Nurse Anesthetists (AANA) selected a new Moodle-based LMS in 2015. Therefore, AANA's LMS is compatible with ASA's LMS. That opens numerous possibilities for collaboration; from cooperative course development to establishing a dynamic directory of courses that will list courses from both LMS systems. The American College of Surgeons (ACS) uses EthosCE as its main LMS and Moodle LMS is being used for a few programs. Finally, the American Academy of Anesthesiologist Assistants uses the ASA's LMS. Those selections may significantly influence the context and perspectives interviewees have on QIE/IPL. My hope is that research will help to better navigate toward improved and coordinated utilization of learning technology available to members of the perioperative team.

2.2.8 Evolution of technology-enhanced learning used by U.S. anesthesiologists

Distance learning of the U.S. healthcare workforce has a long history, starting with correspondence education in the 1960s (Josseran & Chaperon, 2001). Some popular correspondence programs for perioperative clinicians, such as Refresher Courses in Anesthesiology, were initiated in the early 1970s (ASA, 1973).

Online learning has become the dominant way of delivering CPD/CME. In 2010, Harris et al. (2010) predicted that "*online CME is likely to be 50% of all CME consumed within 7-10 years.*" Seven years later, in 2017, all education delivered by the ASA was online or enhanced by online formatting (reflection and claiming credits). That happened significantly faster than expected, and it aligns with the now widely accepted opinion that online CPD programs are as effective as traditional CPD programs (Wutoh, Boren, & Balas, 2004), and that a physician's time is very expensive.

[1] Totara: FAQ for Positions, Organizations and Competency Hierarchies, http://help.totaralms.com/FAQs_for_Hierarchies.htm,

Five generations of distance education, as described by J. C. Taylor (2001) and later elaborated on by Bates (2008), can categorize the evolution of CPD as provided by the ASA.

1. **The Correspondence Model,** based on print technology, is losing its share, and is enhanced with online delivery. However, it still plays a significant role in the process. In 2017, approximately 30% of CPD credits claimed by ASA users were earned through this model.
2. **The Multi-Media Model** delivers multimedia content on print, digital storage devices (CD/DVD, flash memory), or through the internet, but without any communication among humans. It is well-suited for industrial mass production. It is the dominant method of delivery, with around 68% of credit hours offered in this format.
3. **The Tele-Learning Model** delivers synchronous communication, such as webinars, and is used quite rarely in CPD. There were no CPD credits awarded by ASA using this model between 2012 and 2018.
4. **The Flexible Learning Model** is based on asynchronous online communication (Bates, 2008). In the U.S. healthcare CPD context, it is now very rarely used, and there is significant potential to extend usage of that model (Cheston, Flickinger, & Chisolm, 2013). The first ASA course that utilizes a discussion board was launched in March 2016. On the other hand, both ACS and AANA are supporting online communities—which can be viewed as variation of this model.
5. **The Intelligent Flexible Learning** model is being engineered around the LMS. It builds on the functionality of the Flexible Learning Model. Some of the additions are: easy access to institutional guidelines and resources; computer-mediated communication; user-generated content; and peer assessment. There is ambition to create a business intelligence layer that suggests future learning topics based on users' clinical performance, and performance in courses and certification status (Lepkowski & Higgins, 2015).

Specific learning theories are associated with each of those generations. Generations 1 and 2 are associated primarily with behaviorism and cognitivism (Bates, 2008). A majority of CPD is delivered through the first two generations of distance education. Generation 3 is not popular anymore and, instead of implementing Generation 4, the goal is to go straight to Generation 5. Generation 5 utilizes constructivist approaches like collaborative learning, knowledge construction, communities of practice and self-directed learners (Peters, 2002). Between the first two generations and the fifth generation, we have significant technological, theoretical, and cultural differences.

As described below, the U.S. healthcare reform and recently adopted educational technology solutions will support those changes to happen in the form of IPL and QIE. However, the technology is just one element of that formula, and there are many challenges that we must address prior to successful implementation. For example, ASA faculty, just like faculty at medical schools, is not well-informed on learning theories used in this context (Flynn, Jalali, & Moreau, 2015). That is a major strategic challenge. Without faculty who know how to lead and give structure to learning activities, "*social media can negatively impact student learning*" (Gikas & Grant, 2013, p. 19) and cause significant frustration.

2.2.9 Transformation of healthcare CPD

Technology is just one driver transforming healthcare CPD. The list of other drivers is extensive. They include the evident need for better implementation of adult and collaborative learning principles, the need for more outcome-focused education, involvement of patients in the learning process (D. Price et al., 2012), and dynamic evolution of worldviews (introduced at p.28).

The didactic CME/CPD model currently used in the U.S. has been heavily criticized (Cooke, Irby, & O'Brien, 2010; Hager et al., 2008; IoM, 2010; Mehta, Hull, Young, & Stoller, 2013). Weaknesses include low efficiency, inflexibility, and not being learner-centered. Mehta et al. (2013) explain that the current teaching methods are often designed to address "*arcane assessment methods (e.g., Multiple-choice examinations)*" (p. 1418). Consequently, the learning process focuses more on test performance than on development of professional competencies, and grades will reflect more on students' memory and test-taking skills, rather than behaviors, skills, and attributes needed by an effective clinician.

CPD focus and cultural change. Historically, the focus of CME/CPD was primarily on content transmission and clinic topics. More recently, strong societal forces are converging in a focus shift toward behavior-changing learning activities with impact on patient population (Donald E Moore, Green, & Gallis, 2009; Russell, Maher, Prochaska, & Johnson, 2012). We can also notice a shift of focus from individual learners toward CPD of groups and organizations (Olson, 2012; Webster-Wright, 2009). That transformation is part of a focus shift from continuing medical education (CME) toward CPD (Figure 5). In that context, the CPD term serves as an umbrella that encompasses formal CME focused on medical practice, and all other forms of healthcare learning—including QIE/IPL (Karle et al., 2012). Furthermore, CPD covers multifaceted competencies important for patient care—such as awareness of cultural differences, communication skills, managerial, social and interprofessional education, and humanitarian and psychological aspects of care (WFME, 2015). That is a huge cultural,

epistemological, and ontological change for all traditional members of the medical learning continuum and newly associated groups, such as anesthesiology assistants, technologists, managers, leaders, educators, and learning scientists.

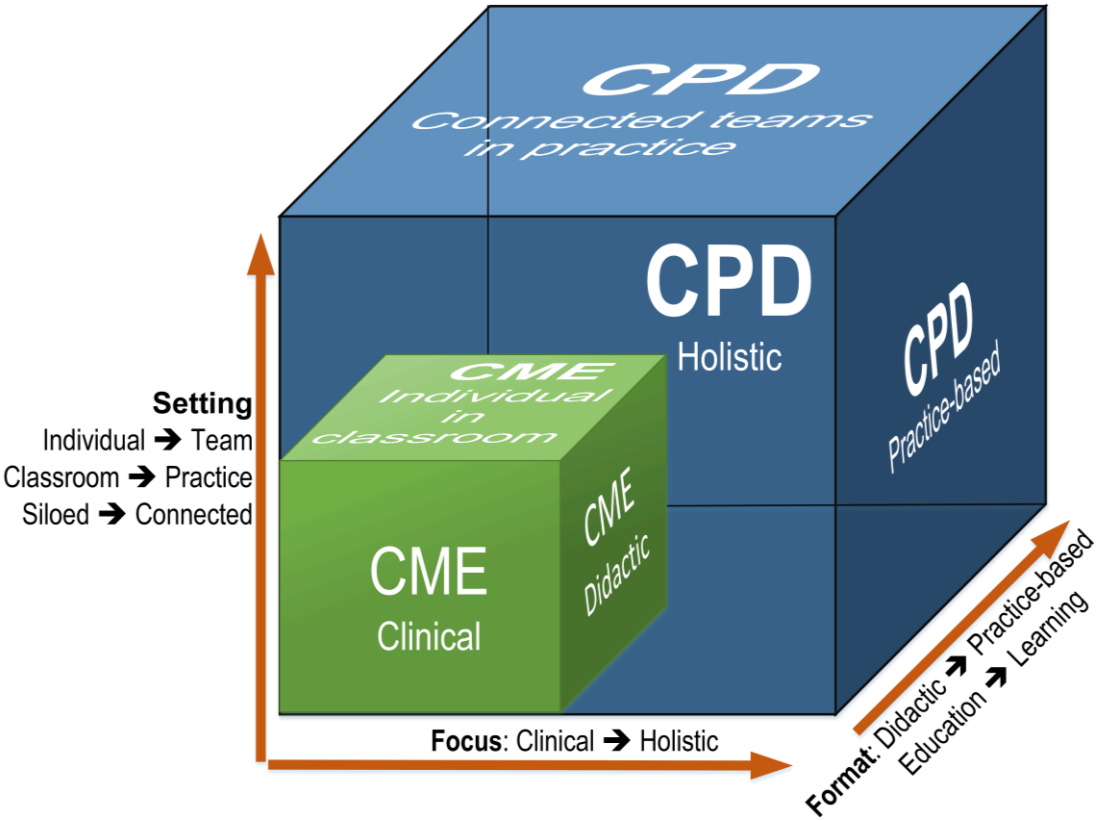


Figure 5. Evolution from CME to CPD (D. Davis, Fox, & Barnes, 2003).

Ontological challenge. During this research I had very intimate experience with the scale and complexity of transformation from CME to CPD brings—especially the ontological part of it. I was trying to analyze complexity of interprofessional collaboration and system learning and improvement through lenses of various interpretative and empiricist ontologies—without much success. It was only after I started using the stratified critical realist ontology that I started connecting dots from all corners of this complex picture.

About Critical Realism. Bhaskar initiated critical realism in an attempt to answer the question, "*What must the world be like for science to be possible?"* (Bhaskar, 2008, p. 13). And yes, I believe critical realist ontology delivers the answer. Figure 6 illustrates differences between critical realist stratified ontology and two other commonly used ontologies: positivism and constructivism. While positivism equates reality with what can be observed, and constructivism suggests that reality is constructed through human knowledge and discourse, critical realists recognize stratified reality. Only one part of that reality we can experience. Critical realist ontology will be discussed in more detail in the Methodology chapter.

Ontology and complexity. A thought worthy of attention at this point is that migration from CME to CPD, and implementation of QIE/IPL, might be very challenging because the ontology we use does not support insight into complex social reality associated with CPD. Therefore, since we don't have mental models to comprehend the full complexity of social reality, we limit our actions only to simple things we can easily understand or easily measure. We are just scratching the surface—as Figure 6 illustrates.

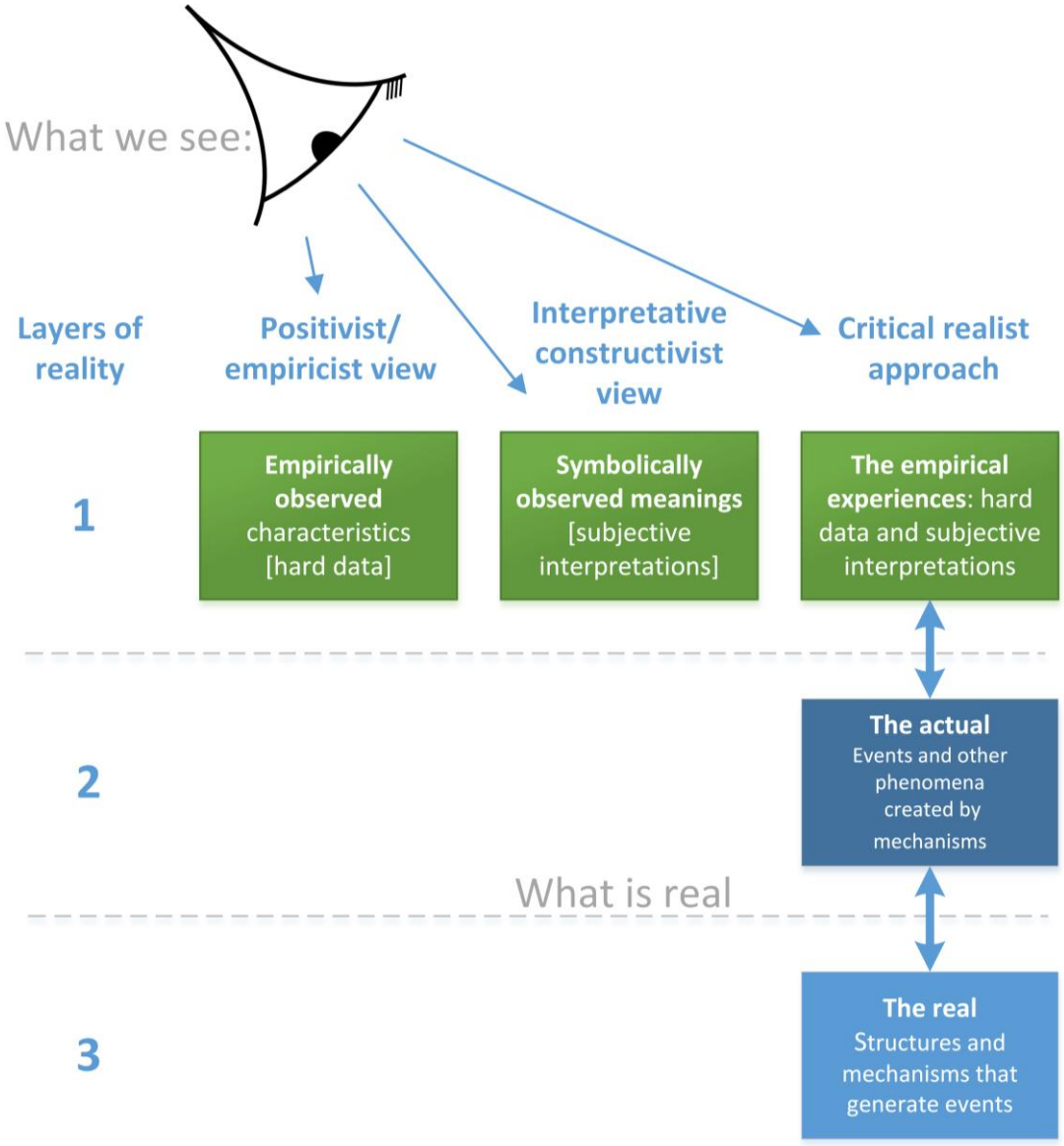


Figure 6. Ontological views on social reality. Adapted from (adapted from Wuisman, 2005).

Quality vs. Education. Our limited ambition to manage complexity of learning interventions may be the reason why, until recently, continuing education of healthcare professionals and quality improvement initiatives existed as two very separate entities. It has been common to hear that CME and QI people may have offices next to each other—but they do not talk to each other; they do not speak the same language; they do not have the same focus (Shershneva, Mullikin, Loose, & Olson, 2008). For example, CME focused on credit hours has

been awarding credit for seating time (Jacobs-Halsey & Davis, 2017; Schmitt, Baldwin, & Reeves, 2012). Simultaneously, QI initiatives are focused on implementing sustainable organizational and individual behavioral change. In recent years, we have seen a significant shift (Balmer, 2013). Innovative approaches to integrate education and QI are being developed and implemented (Shojania, Silver, & Levinson, 2012).

Repeating history? Although recent developments may suggest that integration of education and QI and IPL is a new phenomenon, it is not the case. A recently republished article focused on "*Relating Continuing Education Directly to Patient Care [Quality]"* (Brown & Fleisher, 2014), was first published 47 years ago—in 1971. In the same manner, the first report created by the Institute of Medicine (IoM, 1972) was focused on IPL. Therefore, while analyzing interaction between QI/IPL and education, the question should not be: "Why haven't we figured that out before?" but "Knowing what we do, why haven't we made the required changes?" Or even better: "When and why did education and quality improvement become disconnected?" Complexity of the issue and our reluctance to address that complexity seem to be the main culprit. The following section will tackle a challenge that may have the same cause.

2.2.10 Failure of didactic format and perpetual status quo

Didactic lectures are still the main learning-delivery format, yet the impact of such learning on competencies and patient outcomes is questionable (D. Davis et al., 1999; Holm, 1998; McMahon, 2016; McMahon & Skochelak, 2018). That is not a new debate. Abraham Flexner, the author of the famous Flexner report (Flexner, 1910) and the person who helped change the face of American medical education (Cooke, Irby, Sullivan, & Ludmerer, 2006), was very vocal about it. Flexner criticized the lecture system, stating that although it allows schools to "*handle cheaply by wholesale otherwise unmanageable numbers*" (Flexner, 1908, p. 194), it doesn't prepare students for real-life tasks. The programming should be created around integration of formal learning with clinical practice and research. Therefore, Flexner concluded by describing lectures as "*an astonishing failure of pedagogic insight*" (Flexner, 1908, p. 197). That criticism has been muted by the fact that didactic, content-focused lectures, as a short periodic interaction with a group of students, allow industrialized education. Lecturers can "educate" large numbers of students in a short time. Less time spent on lectures means the lecturer has more time for the research necessary for career development (Colbeck, 1998).

Industrialization of education. Flexner explains that, a century ago, increased reliance on didactic lectures was perceived as a sign that the college was "*grown-up*" (Flexner, 1908, p. 199). At that time, industrialization and mass production were prominent signs of progress. It was a golden age of positivistic, mechanistic thinking. Therefore, industrialization and mass

production gained popularity in education and universities started competing in research instead of quality of education. Flexner sharply criticized that approach, explaining that "*rapidly won distinction as research centers is not compensation for college failure*" (Flexner, 1908, p. 217), and that as soon as people started looking closely at educational function "*it will become evident that the college is nowadays educationally headless*." (Flexner, 1908, p. 218)

Today, more than 100 years after the Flexner report (Flexner, 1908, 1910, 1912) we can see that the dominant teaching and learning model went through only minor changes during the past 100 years (Mehta et al., 2013). Furthermore, some of Flexner's recommendations are in the same stage of implementation as they were a century ago—especially in the CPD context.

Sustainable change? Insight into the full complexity of healthcare learning is needed to make sustainable steps forward. Partial solutions may shake the status quo and allow us a short trip to wonders of complexity. However, if we do not have full comprehension of complexity and methods to manage it, at the end we will be tempted to come back to the safety of simplistic, reductionist thinking.
In the next sections, I will explore concepts that can help us address the complexity of high-performing healthcare delivery and learning.

2.2.11 Back to performance

Learning for quality. For a long time, the learning and research agenda was shaped by funding from industry, mainly the pharmaceutical industry (IoM, 2009). However, regulations are now curbing industrial influence on CPD. Balmer (2013) explains that reduced funding from industry creates a context where CPD of healthcare professionals is paid mainly by learners (institutions or individuals). Therefore, instead of selecting a program because it is free, healthcare professionals more often select programs because they will improve their performance and have a good return on investment. That trend correlates with value-based care initiatives and performance-tracking frameworks that are increasingly being used in the U.S. (Porter & Lee, 2013a; Sibert, 2016). Through such frameworks, individuals or teams can monitor their performance, diagnose performance gaps, and, based on that, plan their professional development.

Vision of Quality. Those trends align well with the vision proposed in "*Health Professions Education: A Bridge to Quality*," by IoM (2003, p. 45):

> *"All health professionals should be educated to deliver patient-centered care as members of an interdisciplinary team, emphasizing evidence-based practice, quality improvement approaches, and informatics."*

As Edward Hundert, M.D. and Mary Wakefield, Ph.D., R.N. explain in the preface to *Health Professions Education: A Bridge to Quality*, (IoM, 2003, p. ix), the main message of the book is: "*…reform of health professions education is critical to enhancing the quality of healthcare in the United States*." Furthermore, that reform must involve all healthcare professionals.

Changes—5 themes. Numerous themes have been initiated in response to the aforementioned challenges. Balmer (2013) described five dominant themes grounded in political, economic, and educational U.S. context. They are:

1. **Shift of focus from time-based attendance metric** (awarding seating time) to measurement of competencies with impact on patient care.
2. **Common usage of interprofessional learning** to enhance profession-specific CPD.
3. **Integration of quality improvement with continuing education**—creating quality improvement education or organization-wide CPD.
4. **Increased focus on the big picture where CPD** acts as a tool to address public health and population issues.
5. **Defining and standardization of professional competencies** needed for successful healthcare services, as well as needed for CPD interventions.

In many ways those themes lead to what the next section discusses: QIE and IPL.

2.3 QUALITY IMPROVEMENT EDUCATION AND INTERPROFESSIONAL LEARNING

QIE and IPL in a connected world. As described earlier, QIE and IPL have 45-plus years of history behind them. Therefore, our perception of them is to a significant extent shaped by how they looked, acted, and interacted during the pre-internet era. It was a very different world from today. We can now videoconference with peers on another continent; we can use one-click access to read up-to-date detailed dynamic reports. Such activities would be seen as science fiction by earlier generations. In the past 25 years, technology has reshaped how we communicate, learn, live, and perceive the world around us (Siemens, 2005). In that context, we can revisit how QIE and IPL look today.

Knowing that the traditional didactic CME/CPD has a limited impact on quality of care (Hager et al., 2008; IoM, 2010; Macy, 2013b; McMahon & Skochelak, 2018) and is focused on individuals, it is fair to say that IPL and QIE have different learning formats and different goals than the traditional CME/CPD.

QIE and IPL have many similarities. They assume that the best way to ensure individual and system-wide professional development and QI is to have a well-integrated and coordinated system (Shortell, Bennett, & Byck, 1998), where healthcare workers from all professions are connected and focused on meeting the needs of individuals and communities (Macy, 2013b). They are both described as great tools to address the same three goals: better care, better health, and reduced cost (Batalden & Davidoff, 2007; IoM, 2013b). They exist in the same context—learning healthcare system (LHS). Finally, the WHO (2010) presented IPL as an important prerequisite for a high-performing collaborative value-based practice and continuous quality improvement. Therefore, QIE and IPL can be viewed as two different entry/view points of the same system-wide learning/networked health system—as Figure 7 illustrates. IPL will start with creation of a skilled, collaborative, practice-ready workforce that can practice quality improvement and deliver optimal health services. On the other hand, QIE will start with system changes that require the collaborative practice-ready workforce IPL can produce. Ultimately, they can be treated as two related parts of the same system. In the later text I will refer to that system as QIE/IPL

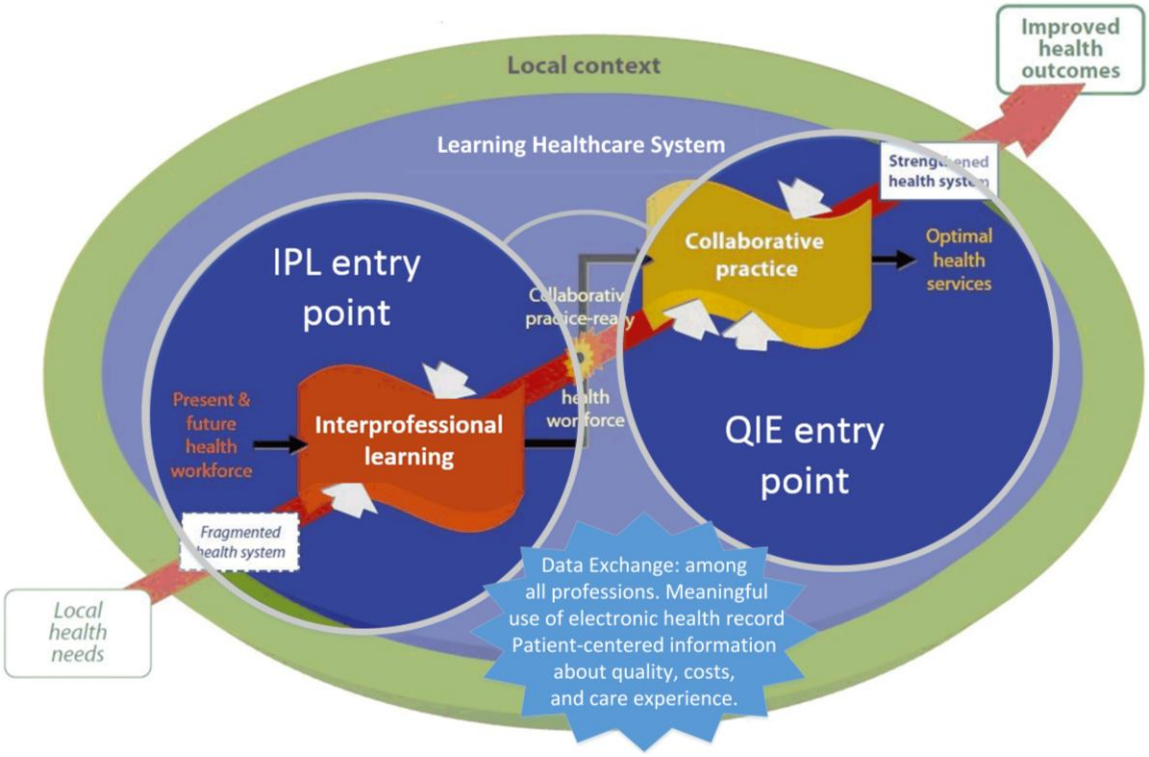


Figure 7. IPL and QIE entry point as lenses into Health and Learning Healthcare Systems. Left lens is more focused on IPL. Right lens is more focused on QIE. Together they provide the full picture (Adapted from: WHO, 2010, p. 9). Used with permission.

The QIE roadmap confirms the same assumption about connections between QIE and IPL. The Alliance for Continuing Education in the Health Professions (ACEHP) in 2015 launched the Alliance QIE Initiative (Sulkes, 2014) and QIE Roadmap (Figure 8). As Figure 8 illustrates, QIE by ACEHP is a continuation of the gradual evolution of CME to CPD—from didactic lectures to practice-based activities with real impact on clinical performance. It assumes incorporation and integration of education professionals, tools, resources and methods into system-wide QI efforts. Since successful QIE changes are usually system-wide, and involve multiple professions, the QIE roadmap presented below (Diamond et al., 2015) predicts the current model of siloed education of healthcare professionals will evolve into interprofessional education during the next 10-15 years. In other words, implementation of QIE and IPL is happening simultaneously, and we cannot separate them.

During that process, current pedagogies focused on content transmission and didactic events—that are not well-integrated in clinical work—will be replaced with pedagogies that integrate quality improvement, clinical practice, interprofessional collaboration, and student- and team-centric approaches (Ladden, Bednash, Stevens, & Moore, 2009). Ultimately, the mental model will evolve from positivism and reductionism, to mindsets like holism, critical realism and complexity. The map was amended by adding theoretical frameworks we use to guide our actions to better illustrate that transformational shift.

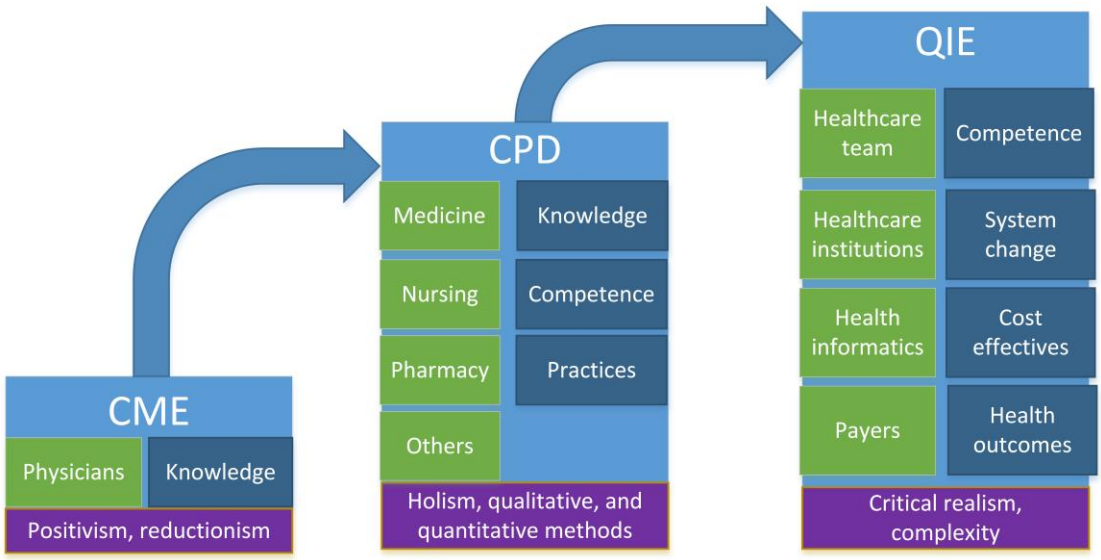


Figure 8. QIE Roadmap: A Transformation Shift
–toward interprofessional team-based QIE (Adapted from: Diamond et al., 2015)

2.3.1 Learning health system—context where QIE and IPL are happening

QIE, IPL, and TEL are phenomena that exist and interact in a learning health system (LHS). It is a complex situation. Therefore, instead of being focused on discrete phenomena, I'll have to focus primarily on connections/interactions between activities and phenomena happening in the system (Bleakley & Cleland, 2015). In this research, the macro system is LHS, while QIE, IPL, and TEL are subsystems.

Learning health system (LHS) is the "*system in which science, informatics, incentives, and culture are aligned for continuous improvement and innovation, with best practices seamlessly embedded in the delivery process and new knowledge captured as an integral by-product of the delivery experience*" (IoM, 2012).

Learning health system is a complex concept. Depending on our ontological and epistemological assumptions, we may draw significantly different pictures, and build significantly different structures.

An insightful presentation of our worldviews and learning systems we are building based on those worldviews (Bawden, 2010) is presented below. The model is built around changes of our ontological and epistemological positions: holism, reductions, contextualism, and objectivism (Figure 9).

Ontological holism perceives the world as a big complex system made of many interconnected subsystems. Therefore, no part of the system can be properly analyzed if separated from the system. To become a valid holistic statement, the result from an empirical test must be imbedded in a theory that explains how it interrelates with the system.

Ontological reductionism, on the other hand, says that a complex system can be perceived as an agglomeration of parts, where each part can be analyzed separately. From that perspective, a result from an empirical test makes a valid statement.

Epistemological contextualism argues that each of us, as individuals and groups, creates a unique interpretation of the world. Therefore, various person- and context-specific interpretations of reality coexist (Rysiew, 2016).

Epistemological objectivism believes that one authoritative truth exists. It cannot be contaminated by individual biases and feelings. However, we may have a challenge reaching that single truth (Goldman, 2010).

Figure 9 illustrates the matrix. The system will be further analyzed and extended with healthcare examples in Discussion (p:163).

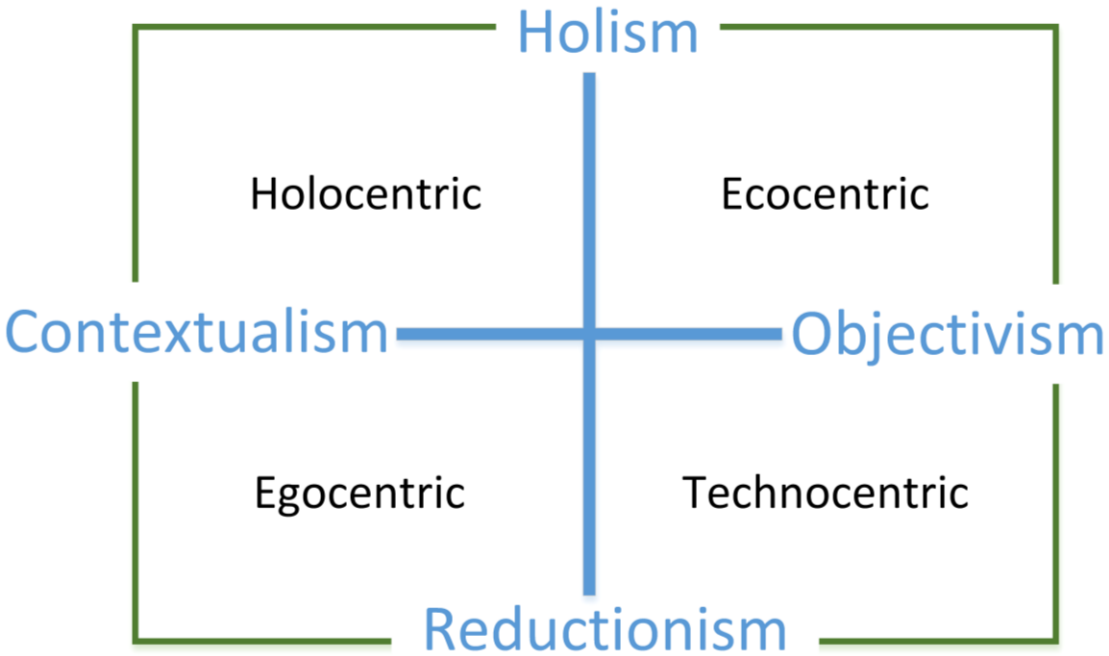


Figure 9. Worldviews and four unique perceptions of a Learning Healthcare System. (Adapted from: Bawden, 2010. Used with permission).

An ambitious, interprofessional, and quality improvement-focused model of networked learning healthcare system was recently described by Britto et al. (2018). The model is implemented in nine separated locations/networks. Therefore, in the next section I will discuss networked learning, and how it can support QIE and IPL.

2.3.2 Networked learning and quality

As mentioned earlier, the CPD of healthcare professionals in the U.S. is going through significant changes. The development of connections among healthcare professionals and the system is an important part of that process. Thus far, professional organizations are serving as learning networks (Margolis & Parboosingh, 2015). However, depending on our

perspective, the visibility of networked learning will change. For example, Jackson and Temperley (2007) argue that if a professional organization and profession is perceived as an established indivisible entity, then facilitating productive discussions about networked learning may be a challenge. However, if we perceive a profession as a network of professionals spread through many institutions and communities of practice, most of them interprofessional, then we may say that the profession is primed for networked learning, and the professional organization is the central node of that learning network.

Fully-featured networked learning is "*learning in which information and communication technology (ICT) is used to promote connections: between one learner and other learners, between learners and tutors, between a learning community and its learning resources*" (Goodyear, Banks, Hodgson, & McConnell, 2004, p. 1). Such a network can foster a shared vision, create collaborative space used to discuss solutions for complex issues, support CPD of participants, and help them build trusting relationships (Margolis & Parboosingh, 2015).

Status of networked learning. Dirckinck-Holmfeld, Jones, and Lindström (2009) explains that development of networked learning environments is essential for successful networked learning. Due to cultural, organizational, legal, and technological challenges, wide adoption of such an environment hasn't happened thus far. However, we have examples of networked learning implemented locally in organizations (Britto et al., 2018). Or following example of Braithwaite (2015)—we can look for examples of successful strategies to support networked systems in non-healthcare literature. Furthermore, in all four areas of challenges, positive changes are happening very quickly. The healthcare social media landscape is very versatile and dynamic (Fogelson, Rubin, & Ault, 2013). The number of healthcare professionals using social media is growing exponentially. For example, Sermo.com alone provides secure networking and crowdsourcing opportunities to 800,000 credentialed physicians from 150 countries (sermo.com, 2018).

Team-based and networked learning for healthcare teams. Team-based education and networked learning have many characteristics of QIE and IPL (Bornkessel et al., 2014). Many programs delivered through team-based education and/or networked learning are in essence QIE/IPL modalities (Bate, 2000; Carter, Ozieranski, McNicol, Power, & Dixon-Woods, 2014). Therefore, they can be used as a basis for future development of QIE/IPL. A few promising examples—simulations, QI interventions and networked experiential learning—are described in the following paragraphs.

Simulation education proves to be a great context for interprofessional, quality-focused team-based training (Hinde, Gale, Anderson, Roberts, & Sice, 2016; Navedo, Pawlowski, & Cooper, 2015). In that context, multiple healthcare professions (physicians, nurses, physician assistants) and associated healthcare professionals (computer science, law, etc.) can learn

together through highly interactive, hands-on learning experience (Paige et al., 2014). Liaw, Siau, Zhou, and Lau (2014) showed that simulations can promote mutual respect, open communication, and shared decision-making, while breaking down stereotypes toward physician-nurse collaboration. At the same time, the impact of simulations can be significantly improved if they are well-integrated into reflective, collaborative learning and working; if they reflect the cultural and social context of a team; and if participants are empowered by a network of peers, teachers, and resources while they are implementing changes in their local environment (Stocker, Burmester, & Allen, 2014; Zigmont, Kappus, & Sudikoff, 2011).

The ASA and ACS each support their own network of high-fidelity simulation providers.
After—often interprofessional—simulation exercise and reflection, all participants must create a performance improvement plan. That makes all three elements—simulations, IPL, and QIE—connected in a comprehensive learning experience.

Quality improvement initiatives have been significantly promoted with the new pay-for-performance reimbursement system (Britton, 2015; Porter & Lee, 2013a). Healthcare providers are required to track their performance, and they are awarded for QI initiatives. Therefore, QI initiatives have become mainstream. Impactful QI initiatives are very often multiprofessional. However, QI initiatives do not have direct connections with CME and maintenance of the certification credit system. Therefore, the American Board of Medical Specialties has created the Multi-Specialty Portfolio Approval Program. Through that program, participants can get maintenance-of-certification credits for institutional, multispecialty-team-based quality-improvement activities (Irons & Nora, 2015).

Experiential & networked learning is the last example I will use. Campbell (2016) convincingly argues that in the digital age any form of experiential learning is at least partially built on participation "*within a digitally mediated network of discovery and collaboration*" (Campbell, 2016, p. 71)—therefore it is a form of networked learning. Furthermore, Campbell reminds us that we still use a collection of pre-digital networked learning practices—the library. "*Enter the stacks, and run your fingers along the spines of the books on the shelves. You're tracing nodes and connections. You're touching networked learning—slow-motion and erratic, to be sure, but solid and present and, truth to tell, thrilling*." (Campbell, 2016, p. 70)
Bates (2015) criticizes that argument, stating that Campbell's high-level pedagogical justification of networked learning lacks detailed support. The quality of networked learning and experiential learning can vary—just as the quality of any teaching method can vary. Therefore, it is fair to say that Campbell's statement is correct only if we can support high-quality networked learning. Otherwise, we should consider alternative modalities.

This thesis will build on those thoughts, and look for ways to deliver more effective networked learning-enhanced QIE and IPL modalities—so that networked learning can become a viable CPD option.

As complex endeavors, networked learning, QIE, and IPL require a strong theoretical background. Therefore, in the next section I will review theories behind QIE and IPL.

THEORIES BEHIND QIE AND IPL

There are a number of theories that can be used to define and analyze IPL (Hean, Craddock, Hammick, & Hammick, 2012) and QIE. The approach to theory in papers on QIE/IPL has evolved from not using any theory at all, to using multiple theories to explain the concept. However, that progression has been slow and sporadic. Even today, significant numbers of CPD papers do not reference theory (Olson, 2013), or they mention theory merely as "*unspecified borrowing of philosophical terminology*" (Klette, 2012, p. 23). Consequently, much of CME/CPD have lacked "*a grounding in accepted educational theory and research-generated evidence*" (Rayburn, Davis, & Turco, 2017, p. xix). Many QIE/IPL papers, as a subset of that group, follow the same trend.

As described below, in most cases, a specific theory can describe just part of the process. Therefore, we must combine theories. Relevant theories can be categorized primarily as theories that explain QIE/IPL educational process, and theories that describe interprofessional QI practices. A secondary level of classification, mainly based on historical divisions, are theories related to QIE and theories related to IPL.

QI theory. The value and function of theory in healthcare quality improvement has been seriously neglected (Davidoff, Dixon-Woods, Leviton, & Michie, 2015). At the same time, factors influencing sustainability of QI interventions have been poorly understood (Hovlid, Bukve, Haug, Aslaksen, & von Plessen, 2012). That is a huge issue—often causing QI interventions to fail. After such failed QI intervention, we usually return to old underperforming work practices. It is a significant waste of time and resources and, eventually, can fuel resistance to future QI initiatives. Therefore, more vigorous and better-informed use of theory is essential to strengthen QIE/IPL programs, ensure valid assessment of their impact, and promote their sustainability and generalizability of outcomes (Davies, Walker, & Grimshaw, 2010).

Role of theory. Unfortunately, theory is usually perceived as something mystical and impractical; something even educators and quality professionals do not want to deal with. That contradicts practice needs. Theory—*or the explanation/belief why things are happening*—is intimately integrated into almost all our activities. Theories may be formal or

informal, public and shared, or private. Yet theories drive our decisions and shape our impact (Hean et al., 2012). Whether the theory says: "*This is how it has been always done—and therefore we should not change it*," whether it is an informal experience-based theory used by a small team, or it is an official, publicly developed theory, it will have an impact on our activities (Tilly, 2006). The question is not: *Are we using theory?* We know we are. The questions we should ask: *Are we aware of that theory? How good is it? Is it the right theory?*

Practice shows that when we lose sight of the importance of theory, bad things happen. A weak hypothesis or even just a hunch, biased and limited in scope (Kahneman, 2011), can be used to drive our actions, often with negative results. Lack of a theoretical background is a common reason why QI and patient-safety interventions in healthcare often result in limited positive changes or no relevant changes at all (Shojania & Grimshaw, 2005). If the intervention proves to be successful, but lacks a sound theoretical basis, it is usually hard to make it permanent and generalize it in other contexts (Dixon-Woods, Leslie, Tarrant, & Bion, 2013).

The literature gives a variety of theories that may foster sustainable QI change. That variety ranges from a big set of learning theories and change agent theories, to organizational change and economic theories. McDonald, Graham, and Grimshaw (2004) argue that it may be challenging to develop interventions based only on one of those theories. Effective QI strategy can be developed more easily when theory and implementation are tested simultaneously. As a manual to help users navigate that process, Kaplan, Provost, Froehle, and Margolis (2012) developed Model for Understanding Success in Quality (MUSIQ). The model describes 25 contextual factors that may influence the success of QI projects. It serves as a checklist of elements that should be included in a QI theoretical plan.

IPL theory evolution in many ways mimics the evolution of QIE theory. In the early days of IPL research, a considerable number of papers were very pragmatic and didn't describe a theoretical background. Many later papers grounded IPL research in a single theory—usually related to a specific school of thought and academic discipline (H. Barr, 2013). Today, a growing number of papers build a sound, flexible, and inclusive IPL framework by combining multiple theories and practices. As a result, Hean, Craddock, and O'Halloran (2009) argue that a large number of theories currently used to describe IPL have created a hard-to-navigate swamp.

A description of a few most popular elements of that "swamp" is below. Due to limited size of this thesis, the descriptions are brief. I will describe a few theories in more detail in the Methodology chapter. Finally, at the end of this chapter I will introduce activity theory (AT) and elaborate on critical realist ontology, as a toolset that may help us drain, or at least better organize, the swamp.

Social theories (social constructivism, social capital) (Hean et al., 2012), adult learning (P. G. Clark, 2006), identity theories, situated learning (Ranmuthugala et al., 2011; Wenger, 1998, 1999) and networked learning (Dev & Heinrichs, 2008) are the main theories relevant to QIE/IPL learning processes. On the other hand, the theories most relevant to the QIE/IPL context are sociology of professions, organizational theory, and AT. They present a compelling example of how different theories complement each other. For example, Larson (1979) argues that professional guilds are actively engaged in monopolizing knowledge in specific areas, to ensure cognitive exclusivity. That may explain why, despite learning organization (C. Roberts & Thomson, 1994; Senge, 2006) being a very popular theory concept (H. Barr, 2013), it is especially hard to achieve it among different professional organizations. Fortunately, AT allows us to analyze organizations as "*distributed, decentered and emergent systems of knowledge*" (Blackler, Crump, & McDonald, 2000, p. 278); it provides insight into connections between activities and context and reasoning behind complex social activities.

The connected, networked nature of modern life and work is at the heart of learning as a social activity, and knowledge as a social construct (Hean et al., 2009). Therefore, to fully understand learning, we must analyze curricula through a social theoretical lens. Only through that lens will we be able to understand how organizations, professional societies, professional regulations, education providers, and communities of learners shape the knowledge development process.

Social capital theories are focused on the benefits individuals and society can achieve by nurturing a strong social network. They describe social capital as an equilibrium concept (Boix & Posner, 1998). Social capital will increase through repeated cooperation and collaboration. In return, strong social capital will boost social collaboration and the happiness of individuals.

Research of A. Leung, Kier, Fung, Fung, and Sproule (2013) showed that social capital is one of the major cornerstones of happiness. In the healthcare field, social capital is popular due to the known relationship between social capital (strong social network) and health benefits. Ultimately, social capital, happiness, and collaborative behaviors can significantly improve tacit and explicit knowledge-sharing among employees—creating a basis for a productive learning organization (Hau, Kim, Lee, & Kim, 2013). Therefore, social capital theory can be used to describe benefits of interprofessional, networked learning, and guide us to maximize benefits from that learning model.

Adult learning theories are often described as a cornerstone of successful QIE/IPL. They provide a toolset of learning modalities that motivate students as individuals and groups to activate existing knowledge and use it as a platform to develop new knowledge. In this context, they can be viewed as an extension of constructivist learning theories (Huang, 2002;

D. C. Taylor & Hamdy, 2013). As Knowles, Holton, and Swanson (2005, p. 193) explained: "*The parallels between moderate views of constructivism and andragogy are rather striking*".

Networked learning theory uses connections between students, students and teachers, and between students and resources and tools to create a framework where students (working professionals) as individuals and groups have access to all elements needed for successful CPD. It creates a framework that connects CPD providers and the professional learning community (Jackson & Temperley, 2007). Whether they need access to content, expertise, QI tools, or peer moral support, students will be helped by networked learning principles. With that, students can combine real-world context and highly integrative learning activities to address complex situated problems (Campbell, 2016).

Community of practice, as situated learning theory, can explain many benefits professional societies provide to their members (Webster-Wright, 2009; Wenger, 1998, 2000). The society and profession acts as a community of practice; a community of professionals that jointly work together to improve practice in a specific domain (health, nursing, surgery) (Simons & Ruijters, 2004). There is potential to further support that community with social media.

What we can notice from the aforementioned brief descriptions is that there is lot of overlap between theories, and that theories often complement each other (Hean et al., 2012). For example, networked learning will benefit if social capital is strong, and social capital can be further enhanced with properly designed networked activities. Adult learning in the QIE/IPL context will also be enhanced if social capital is strong and the properly networked practices are in place. Ultimately, community of practice can benefit from all aforementioned theories—and create a framework where they can be better implemented.

2.3.3 Draining the Swamp

As the last part of this discussion on theory, I will present Activity theory (AT) and Critical Realism as two theories that might help us drain, or at least better organize and understand, the theoretical swamp Hean et al. (2009) mentioned.

While being significantly different, AT and critical realism are complementary theories often used together (D. K. Allen, Brown, Karanasios, & Norman, 2013; Nunez, 2012; Wheelahan, 2007). Together they allow us to simultaneously analyze development of individuals as reflective and curious practitioners in a complex social environment, as well as analyze that environment and the whole society (Wheelahan, 2007). They allow us to analyze complex networks of actors, components, and various relationships between them, instead of being focused just on part of the picture.

Critical realism as a comprehensive theory of science (macro theory) with specific ontology, creates a framework that empowers AT to provide proper critique of empiricism (Nunez,

2012).

Simultaneously AT as "*powerful and clarifying descriptive tool*" (Nardi, 1996, p. 44) helps map technology within complex activity systems. With that we can better theorize how contradictions and alignments between cultural, social, and technological drivers are shaping transformations of complex systems (D. K. Allen et al., 2013).

Ontology. I will start with critical realist ontology. I believe it acts as an important game-changer. While many theories, and many authors, reduce ontology (i.e., structure of reality) to epistemology (i.e., nature of knowledge), critical realism has a firm position that it is not possible (Bhaskar, 2008). Critical realism says that we have stratified three levels of reality (see Figure 6). We can only see the first empirical layer. Understanding what, why, and how it is happening in hidden layers of our reality can be achieved only if we use theory to dig deep in actual and real layers.

Epistemic fallacy. Attempting to ignore ontology and rephrase ontological questions as epistemological is called epistemic fallacy (Bhaskar, 2008). I mentioned before that CPD context published literature almost as a rule doesn't mention theoretical terms like "ontology" and "epistemology" (see page 56). Papers that do mention them usually equate ontology and epistemology, or skip ontology. That assumes that the structure of our reality is reduced to ways we can perceive that reality. Whether we are talking about positivist (and usually quantitative) reality, or interpretivism (and usually qualitative) reality, that approach will not allow us to understand all elements of the system.

Different worlds. For example, proponents of positivist epistemologies argue that our world is created only of real things we can observe, and everything else can be ignored. Meanwhile, proponents of interpretivist epistemologies may argue that our world is created through subjective interpretations, and everything else is irrelevant.

Those are two very different worlds, very different ontologies, and we experience significant challenges if we try to combine data from them.

Layered critical realist ontology is compatible with numerous epistemologies. Therefore, it can serve as a glue that connects findings from various epistemologies, creating a comprehensive picture.

Metaphor of elephant and blind men is a simple illustration of epistemic fallacy. If we don't know the nature of the world we are researching (in this metaphor it is an elephant), our conclusions will likely be wrong (as Figure 10 illustrates). Consequently, theories we develop in an attempt to interpret those findings will likely be contradictive—creating a hard-to-navigate quagmire (a swamp).

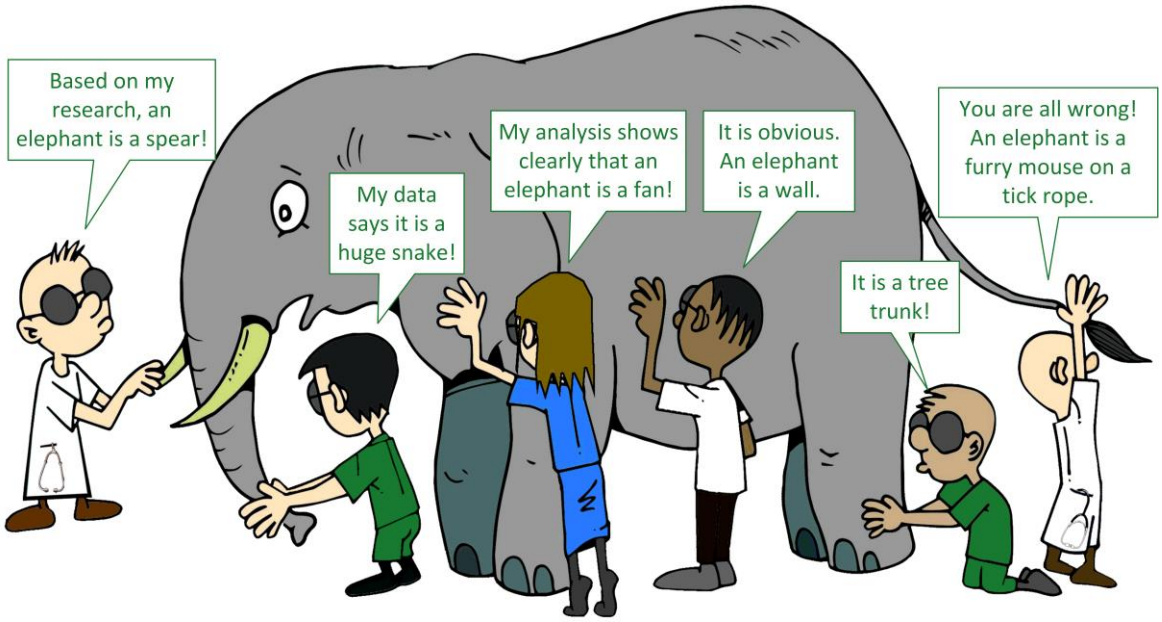


Figure 10. Blind men and elephant—a metaphor of epistemic fallacy. Modification of an image in public domain (MoteOo, 2018).

Multiple epistemologies. While critical realism has a clear definition of ontology, the approach to epistemology is liberal. Critical realism says that we should choose epistemologies that match parts of reality we want to research. Therefore, dependent on tasks, we can combine multiple epistemologies.

The elephant metaphor can be handy in this example too. If the blind men know the ontology of the object they are researching, each of them can select epistemology that can match the part of the elephant they are researching. Later, the shared ontology will allow us to benefit from findings from each man—to glue various findings and various perspectives into one complete picture.

In the other words we can use the layered critical realist ontology to convert the hard-to-use theoretical swamp surrounding IPL and QIE into an arsenal of tools we use to assess all layers of IPL and QIE.

Theory-driven. Clinical teaching, especially QIE and IPL, are complex processes heavily influenced by complex context (Ogrinc & Batalden, 2009). Therefore, research based on traditional ontologies and epistemologies (or lack of them) is usually of limited value. To address critical realist ontology, we should use theory-driven approaches. The process is: based on the findings—we create theory that describes all our assumptions about how the intervention will work, and then we test that theory (Pawson, Greenhalgh, Harvey, & Walshe, 2004). The process is in many ways similar to critical clinical thinking where, based on various symptoms, clinicians craft diagnosis—as the most probable theory (Gambrill, 2012). Later they test the theory by monitoring the status of the patients. Tools that provide insight into the

symptoms (stethoscope, for example), or additional info about the body (blood work) can significantly increase validity of diagnosis.

This is where critical realism and AT work well together. Critical realism, as a comprehensive theory of science, creates a strong framework for AT. Simultaneously AT benefits critical realism by:

1) mapping technology, people, and our needs in the activity system of our reality, and theorizing how various contradictions and alliances are shaping that reality;
2) contributing critical realism-inspired explanations of how technology interacts with our society, our culture, and each of us individually; and
3) helping critical realism researchers assess how technology and QI concepts are behaving in different contexts (D. K. Allen et al., 2013).

AT, as a macro theory, can be used as a descriptive framework considering all major elements of a complex healthcare activity system. Examples of an activity system include a perioperative surgical home team or an organization such as the ASA. Therefore, AT can serve as a lens to analyze human activities in such a complex and dynamic system. AT will be presented in more detail in the Methodology chapter (p:81). The third generation of AT (Figure 11) is specifically interesting for interprofessional research because it is focused on how different activity systems interact (Engeström, 2001). Each profession (anesthesiologists, nurse anesthetists, surgeons, etc.) and patients or the public can be analyzed as a separate activity system. The third generation of AT can help us understand how those systems interact during preparation for implementation of QIE/IPL activities. A small detail that confirms the suitability of AT is that the paper introducing the third generation of AT (Engeström, 2001) uses interaction among healthcare activity systems (hospital, patient's family) as the main examples.

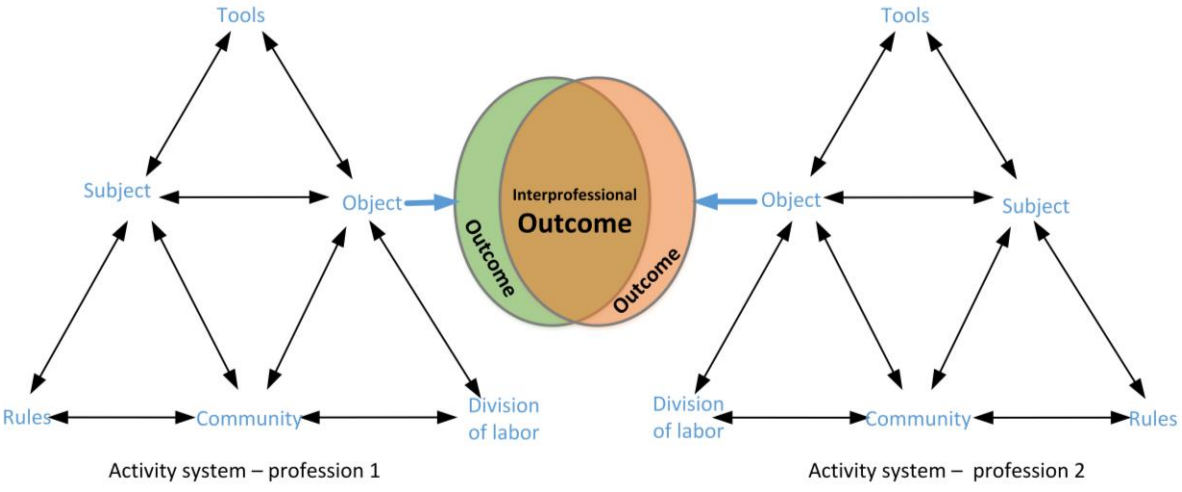


Figure 11. Two interacting activity systems are the minimal model for the third generation of activity theory (Engeström, 2001). Each profession can be analyzed as a separate activity system. Outcomes of each profession interact, creating outcome of collaboration—interprofessional outcome.

2.4 CONCLUSION

Healthcare socio-economical and educational context is extremely dynamic and influenced by many interrelated drivers. It is becoming an increasingly connected and networked. Therefore, connecting learning and quality, connecting many professions in collaborative learning endeavors, and utilizing networked learning concepts to make that happen, is becoming the new normal.

Numerous trends show that we are going in that "networked" direction. Yet various political, social, cultural, research paradigm, and educational drivers clash, creating a very dynamic system.

This research will analyze how members of a perioperative team perceive the system, the associated changes and challenges, and suggest strategies to address them.

In this chapter, I gave the critical literature review of QIE, IPL, and contextual and societal factors that shape their adoption. Numerous issues have been identified, and the research design—described in the following chapter—will ensure that the issues are investigated.

3 METHODOLOGY

Key points

- **This research is a revelatory critical realist case study** where perceptions of QIE, IPL, and TEL are analyzed as one case. I selected the holistic, single-case case study design because the theories underlying this case study are of a holistic nature.
- **The study is made of 2 parts**:
    - In part one, I use thematic analysis and AT I draw a picture of how perioperative clinicians perceive QIE, IPL, and TEL, and which mechanisms connect QIE and IPL. That part addresses the first two research questions.
    - In part two, I analyze the complex dynamic between phenomena and craft a theory explaining one mechanism shaping that dynamic. With that, I answer the last research question.
- **Critical realism aligns well with critical medical thinking**. Analogies were used to better present this critical realist research design to readers with a healthcare background.

Theory and practice together—an example

I had just changed into new clean green scrubs, when a code blue was announced. Suddenly, I'm in action mode. That is what I have been training for the past 12 years. As I'm exiting the changing room, I hear paramedics reporting headache, stomach pain, and incoherent speech. Looking at the patient, I notice volcano-like bruises on shoulder and neck; a raised edge surrounds a central crater. Slow, difficult breathing, pupils dilated. Who called code blue? Well, it is my case. Nurse measures pulse, breathing. Temperature 38.7 C. I try to establish contact with the patient. Two residents are standing behind me. Today is their first day.

How will the decision process go? That question made me nervous. An email I got yesterday mentions that each year up to 400,000 Americans die due to medical error (James, 2013). Medical Error has become the third-leading cause of death (Makary & Daniel, 2016).

Not on this team. We have protocols in place. Protocols are essential for fast and well-coordinated response. We'll monitor vital signs and act accordingly. If the symptoms meet the standard, then—bingo—we can use deductive thinking to make a quick diagnosis. Blood work? Sure. We will probably use x-ray and ultrasound to find what's happening in the head and abdomen. But, what if this is another complex case where an avalanche of social, medical, genetic, and behavioral forces creates unique combinations that hardly fit in the predefined schemata.

Yep, complex cases come here often. When that happens, we reassess symptoms, look for patterns of symptoms, medical history, patterns in social environment—so we can define a few possible underlying mechanisms that can explain the patient's status. It means we are crafting theories that can explain/reveal this case. Then, before making the final diagnosis, we vet those theories (we call that differential diagnostics), find the most probable one, maybe run a few more tests, try a few more interventions and see how the patient reacts.

Hmm…How are we creating those theories? Decision-making in a complex, dynamic healthcare system usually happens rapidly, subconsciously, and hidden from our sight (Lawson & Daniel, 2011). Only fragments of that process can be explained with deductive and inductive logic.

Well, my friend told me that clinical thinking in many ways echoes how critical realists think. It aligns with the abductive and retroductive logic.

3.1 INTRODUCTION

In earlier chapters, I described the purpose of the study, and I reviewed the literature. In this chapter, I will present the methodology used in this study. A methodology is the activity "*of choosing, reflecting upon, evaluating, and justifying the methods you use*" (Wellington, 2015, p. 33). Therefore, in this chapter I will present a set of methods and tools used to collect and analyze data and deliver conclusions; and explain why I selected them.

The theoretical background can heavily influence the choice of methods, use of methods, data collection, and data interpretation. Therefore, I will start with a description of the theoretical framework I used in this research. That framework serves as a lens to observe and analyze the world. As described in the literature review, theories are important contributors to all our intellectual endeavors; therefore, they should be clearly defined, whether they are well-constructed and publicly evaluated concepts or personal hunches, fears, or beliefs.

The ethical issues and protection of research participants—as critical elements of research—will be described in the last section of this chapter.
The completion of this chapter will serve as the preparation for the research activity and data collection.

3.1.1 Research design—the big picture

This research is designed as a revelatory critical realist case study. The main source of data is thematic analysis (TA) of QIE, IPL, and TEL perceptions among perioperative professionals and their CPD providers, enhanced by AT. I selected a layered research design to address complexity of the phenomena I analyzed.

Complexity as a tool. Complexity is sometimes perceived as a challenge we should minimize (if not ignore), or as a task we have to address to answer complex questions (Bleakley & Cleland, 2015). Yet, in this section, I will use complexity as a tool to introduce the research methodology. In our daily life, especially in the dynamic healthcare practice, we often face critical, complex questions. While doing so, we quite often use thinking processes that can be associated with complexity theory and critical realism.

As Patel, Arocha, and Zhang (2012) explain, "real world" reasoning can't be explained well through inductive and deductive processes. Therefore, let's try an alternative approach.

Imagine that you are part of the healthcare team addressing the patient above (yellow box). Your task is to find what caused the lesions on neck and shoulder, and how that relates to other symptoms. Medical history reports this is the third time the patient has visited a doctor due to the skin issues. Other symptoms didn't exist before. You take a scraping sample of the infected skin and look at it under microscope. While preparing the slide, you stain it with

Giemsa so the structures are more visible. Now you have a nice slide. You can analyze it in the context of available clinical knowledge, data you collected while talking with the patient about her recent trip to the Amazon River in Brazil, and draw a few possible theories on the mechanism behind this issue (logical abduction); why this issue is repeating; why it is progressing; how can we fix it?

After the theories about possible diseases are created, you will have to vet them and select one (or a few) that makes the most sense (logical retroduction). Then you will assess the patient through the lens of that theory (assumption that she has a specific disease) and use that assessment to create a therapy.

This research uses a similar process. I use literature review as "patient history." I use TA to create "the slide." It is an insightful image illustrating how perioperative professionals perceive QIE, IPL, and TEL. Later, I use AT to expose various structures on that slide—in the same manner as phase contrast or Giemsa stain can enhance a microscopic slide. Then I use the critical realist lens, and logical abduction + retroduction process to research reasoning for patterns found on the slide.

Figure 12 illustrates similarity between the case study of a patient where the goal is to diagnose and cure a disease, and critical realist case study used in this research. In both cases we have a similar process where after literature review/patient history, we 1) create the picture, 2) enhance the picture, 3) create explanation of the observed, 4) vet explanations/theories, and 5) provide recommendations based on findings.

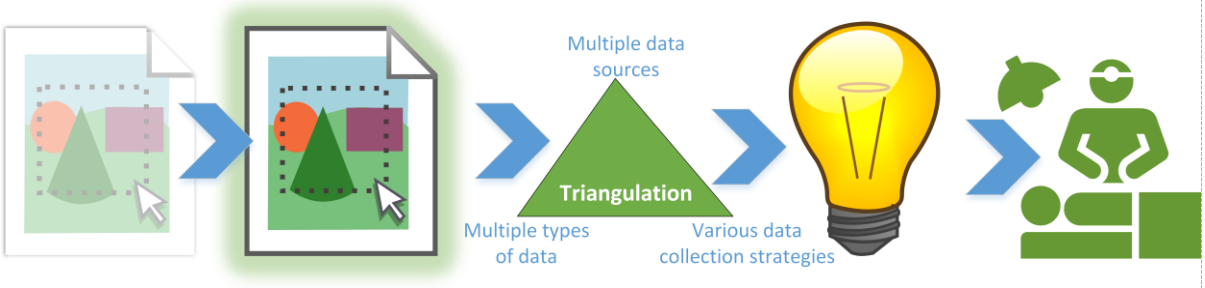
	Medical case study—patient				
	Creating the picture		**Diagnosis: a theory explaining the picture** triangulating data: the slide, literature, history		**Therapy**
Patient history	**1) Microscopic slide**	2) Enhanced microscopic slide (phase contrast or Giemsa stain)	3) Create theories explaining the disease: abduction	4) Select the most probable theory explaining the disease: retroduction	5) Patient status + diagnosis ➔ Therapy
					
Literature review	**1) Thematic analysis** (TA) A picture of how people perceive QIE, IPL, and TEL	2) TA enhanced with AT	3) Create theories explaining the findings from TA: abduction	4) Selecting the most probable theory explaining the phenomena: retroduction	5) Findings + theory ➔ Recommendations
	Creating the picture		**Crafting a theory explaining the picture** triangulating data: TA, literature, observations…		**Recommendations**
	CR case study— QIE, IPL, and TEL of the perioperative team				

Figure 12. Similarities between the process used in this research, and patient as a case study.

Critical realism in medicine. This comparison aligns with calls of authors like Nairn (2012) and A. M. Clark, MacIntyre, and Cruickshank (2007) to use critical realism as framework to assess and improve the clinical-thinking process. Lawson and Daniel (2011) convincingly argue that abductive and retroductive reasoning should be part of medical education during med school, residency, and CPD. Initially, it might look surprising to combine ideas from critical realism and medicine. The layered critical realist ontology is at significant odds with positivist ontology commonly used in healthcare. However, critical medical thinking involves concepts that can be compared with critical realist ontology (S. Fox & Aranko, 2017; Walsh & Evans, 2014; L. Williams, Rycroft-Malone, & Burton, 2017).

Critical realist ontology says that there are three layers of reality: empirical, actual, and real (Bhaskar, 2008). The empirical layer holds events we can observe or experience. Then the second layer—the actual layer of reality holds all events—most of them invisible to us. Finally, the real layer contains structures and mechanisms that generate events.

Similarly, in healthcare, we have symptoms—manifestations of diseases we can observe and measure. That is the empirical layer (Walsh & Evans, 2014). Then we have various physiological and pathological processes that are hidden from our sight, the actual layer. Finally, the real layer is where structures and processes of organisms and pathogens are located (Figure 13). Anatomy, histology, physiology, and pathology are area of medicine focused on specific structures of the real layer. Social and spiritual features of individuals and society, as well our belief system, contribute to that layer.

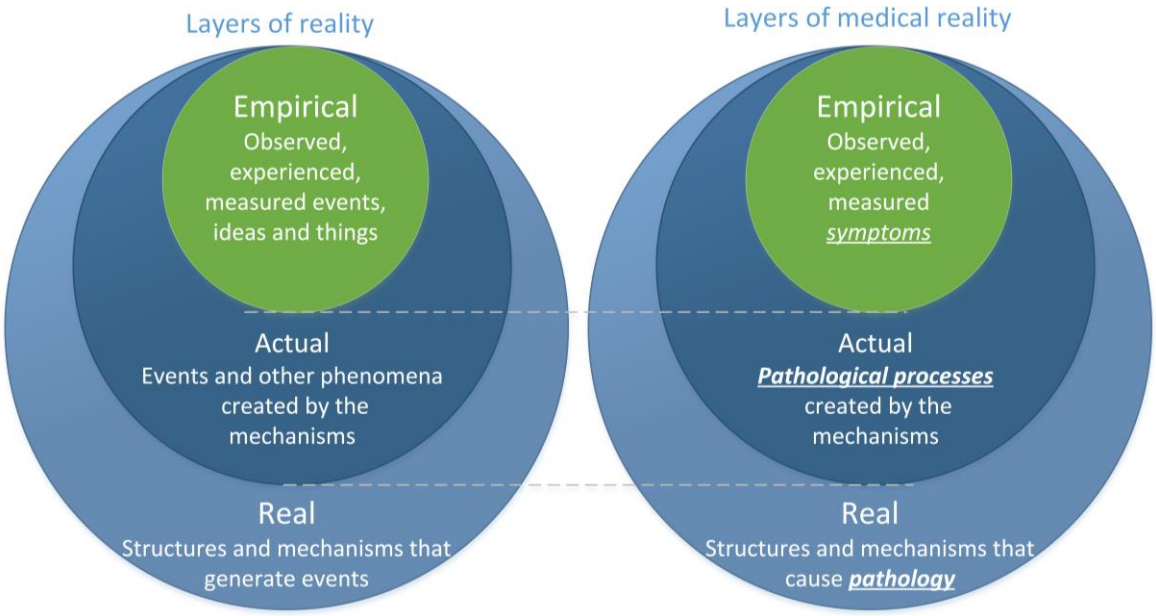


Figure 13. Critical realist vs. medical reality.

3.2 THEORETICAL FRAMEWORK

Importance of ontology and epistemology. Our personal, professional, and societal perceptions and interpretations of the world around us, and the way we learn about that world, have a crucial impact on our intellectual endeavors and research. Therefore, I will present my ontological and epistemological positions. That should help readers interpret and evaluate findings (Cleland & Durning, 2015; Guba & Lincoln, 1994).

Critical realist layered ontology is my dominant worldview (Bhaskar, 2008). It combines the strengths of positivism and interpretivism. Therefore, we can use it as a framework to simultaneously analyze both objective, measurable elements of our reality, as well as subjective socially constructed elements of the reality.

The social constructionist epistemology and its subset, social constructivism learning theory (Curran, Fleet, & Kirby, 2010; Vygotsky, 1978), are in many ways associated with QIE and IPL and my personal worldview. I will use them as a lens to analyze the potential challenges of QIE/IPL. Social constructionist epistemology assumes that groups actively construct knowledge through social interaction internally among team members and as a team interacting with the external world. In that process, they create a group culture, a collection of shared artifacts and mental models. Ultimately, according to a social constructivist view, society exists simultaneously as subjective and objective reality (Andrews, 2012).

Critical-realism and social constructionism. Critical realists and social constructionists agree that our world is socially constructed (Vincent & Wapshott, 2014) and that there is also a real part of the world that exists independently of us. Critical realists believe that we have a limited, but very valuable, possibility to learn about that reality. Social constructivists reject the possibility of knowing the objective reality. Instead they are focused on researching creations of social actors.

This research used both approaches. In the first part, this research is focused on analysis of the social construct—perceptions of the perioperative team. In the second part, the research is focused primarily on critically evaluating reality behind it.

3.3 RESEARCH DESIGN

This research is designed as a critical realist case study (Easton, 2010; Wynn Jr & Williams, 2012). The main source of data used in the study are findings from TA of 30 interviews. The TA is focused on perceptions of QIE, IPL, and TEL in perioperative context. AT and complexity theory are used as lenses that give sharper insight into multiple themes and codes described during the TA

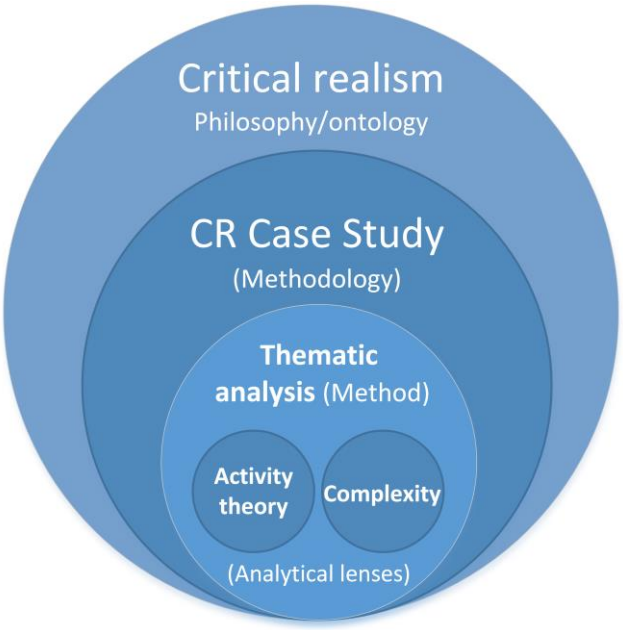


Figure 14. Nested and interconnected elements of the research designed to address the complexity of healthcare learning.

Interaction between TA and AT builds on the model of De Feijter, De Grave, Dornan, Koopmans, and Scherpbier (2011), where AT was used after themes were created to provide deeper insight into experiences. AT helped me connect seemingly distinct themes and better understand contradictions in the system.

Figure 14 illustrates how methods and theories are nested in this research.

In the following sections I will describe elements of research design in more detail.

3.3.1 Case study

Why case study? Since thematic analysis is the dominant part of this research, it was possible to frame this as CR thematic analysis. However, the analyzed data noticeably exceed insight generated by TA (it was triangulated with a wealth of additional sources); therefore, it is better to frame it as CR case study.

The **case study approach** brings various elements together. Therefore, it is better suited to address the complexity of the analyzed phenomena, as well as that of interactions between the phenomena. Furthermore, a case study aligns better with the nature of critical realist research. A case study is, Ackroyd and Karlsson (2014, p. 23) persuasively argue, "the basic design for realist research." Critical realist researchers look to identify and explain causal mechanisms that shape the phenomena of interest. Since at beginning of research the existence and nature of causal mechanism is not known, critical realist researchers should consider various types of data and research strategies. For example, consideration of a

possible mechanism may call for a new research practice and new sources of data. As a result, critical realist researcher can have a very eclectic approach to research methods and data sources. To illustrate this feature of critical realist research, Ackroyd and Karlsson (2014, p. 22) described it as "beg, borrow, and steal" style.

The case study format is uniquely suited to address the eclectic nature of critical realist research and helps researchers identify the underlining mechanism or process. For example, the case study format allowed me to build on findings of thematic analysis and "borrow" insight from eclectic sources such as the biological evolution and psychological development of individuals. Only after "borrowing" from various sources was I able to identify, understand, and explain the mechanism.

Case study design. According to Yin (2009) classification of case study designs, this is a single case design with embedded multiple units of analysis. The units of analysis are QIE, IPL, TEL, and QIE/IPL while the case is the system that these four phenomena create in the context or perioperative care in the United States.

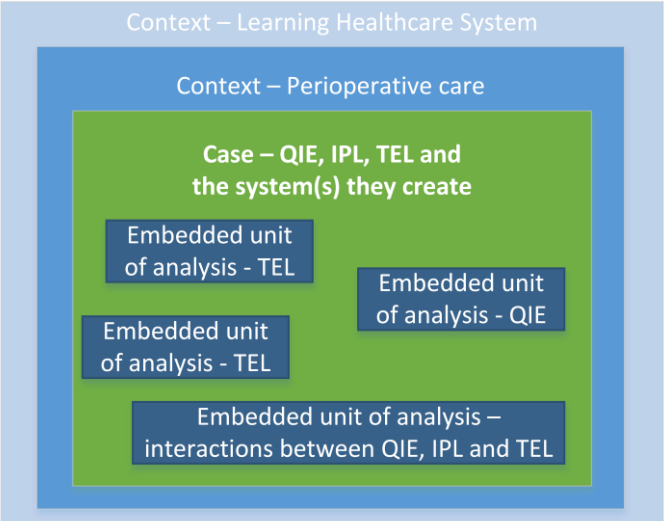


Figure 15. Case study design - single case with multiple embedded units of analysis.

During thematic analysis, my focus was primarily on the four phenomena: QIE, IPL, TEL, and QIE/IPL; meanwhile, in the discussion, I was focused primarily on the system created through the interaction of these phenomena and context—and the mechanism that drives that system.

Critical realism and case study design. Yin's case study design classification (Yin, 2009) is rooted mainly in the positivist school of thought. As a critical realist researcher, I must reflect on two important distinctions:

1) I realize that the world is made of nested complex open adaptive systems (Easton, 2010) and that lines between units of analysis, cases, and context are much more permeable and more blurred than observed through the primary positivist lens by Yin.

2) The main goal of critical realist researchers is to identify and explain the underlying mechanism and processes in that reality. Therefore, case study boundaries define part of our complex layered reality where CR researchers look to discover a new mechanism. It is a

starting focal point. When a mechanism is discovered or considered, the researcher may exceed the scope and look into other parts of our complex reality where such mechanism may exist. The goal is to define and explain the mechanism and ultimately use that insight to better explain the case.

For example, consideration of an important finding of this thesis—a mechanism that guides the evolution of learning systems—was initiated inside the scope of case study (while analyzing the interaction of QIE, IPL, TEL, and QIE/IPL). However, I had to locate and analyze the same mechanism in other contexts (biosocial evolution, the development of a person) to understand and prove that mechanism.

3.3.2 Critical realism

Critical realism as philosophy of science is my research philosophy. It defines the ontology I am using, and nested connections between various methodologies and methods.

I learned about critical realism during the second half or my thesis-writing process. Before that, I spent a significant part of my PhD thesis journey learning about various ontologies; about limitations and potential different ontologies have. A few times, I was lost. I felt like I hit big walls with messages: "*This Ontology doesn't support what you want to do!*" And then I discovered critical realism.

So, what is critical realism about?

Critical realism as a theory of science has become a viable framework for social science research and research of open complex systems (Wynn Jr & Williams, 2012). It started with the desire to answer the question "*what must the world be like for science to be possible?"* (Bhaskar, 2008, p. 13). Critical realism assumes layered realist ontology (Kempster & Parry, 2011), a varied combination of realist and interpretivist epistemologies, and an emancipatory axiology (Easton, 2010). It assimilates elements of both the interpretivist and the positivist research paradigms to develop new approaches to knowledge creation and learning. Therefore, critical realism gives a valid alternative to interpretivist and the positivist mindsets. That feature provides an opportunity to end long-lasting paradigm wars (Given, 2017; van Dulmen, McCormack, Eide, Skovdahl, & Eide, 2017)—once and forever.

Ending paradigm wars. Denzin (2017, p. 21) explains, "*The paradigm wars of the 1980s never really ended.*" In perioperative context, where professions with different paradigmatic affinities collaborate (medicine and nursing, for example), paradigm wars, or even paradigmatic misunderstandings, can have significant negative consequences. As Hovey, Rodríguez, Jordan, and Morck (2016, p. 4) convincingly explain, there is strong need for "*synergistic research approach*" to healthcare education. The idea is that experts from various

disciplines would seamlessly work together, using various epistemologies to contribute one shared research endeavor. While that looks like a significant task, critical realism promises concepts that might help us achieve it.

CR case study. Critical realism is a good framework for any type of case study research, as long as—Easton (2010, p. 119) warns, "*The process involves thoughtful in-depth research with the objective of understanding why things are as they are*." Critical realist case studies are significantly dissimilar with social constructionism/interpretivist and positivist/empiricist approaches (Vincent & Wapshott, 2014). The main benefit of critical realism is that it provides more comprehensive insight into structures and processes behind the events we can observe; it allows us to dig deep under the surface.

So, what are the challenges with positivist and interpretivist approaches?

Positivism and case studies. There are a few reasons why positivism is not the best match for case studies. Positivism takes an epistemological position arguing that simple law-like rules run our material and social reality. Those rules, positivists argue, can be generalized and used as explanation and as prediction (Easton, 2010). There are two noticeable issues arising from that assumption. First, correlation does not imply causation. Therefore, even if we have a number of cases implying correlation, we can't prove causation. Second, even if we do have causation, this approach doesn't provide strong insight in reasoning why such causation may exist, in which conditions it will be activated, and in which it will be altered or deactivated. Very often, all we get is a finding that in specific cases correlation happened. Vincent and Wapshott (2014) explain that positivists can use logical abduction to create multiple explanations of the observed phenomena. However, that is just part of the process. Positivists don't have options to use logical retroduction to test theories and provide explanation of phenomena in a broader social contest: "*There is nothing beyond abduction and nothing to know beyond what we confirm through the data themselves. Deeper levels disappear from view and retroduction disappears as an analytical device*" (Vincent & Wapshott, 2014, p. 149).

Escape to interpretivist ontology. Evident limitations of positivism as a framework for case study research have fueled escape to interpretivist, social constructionist ontology. That move, Fleetwood (2004) explains, means replacing one incomplete ontology with another. Interpretivists reject the possibility of knowing reality, and deny the chance to understand causality. All we have, interpretivists argue, are our own interpretations. And, while each of us can have a unique interpretation, there is not clear framework to assess which interpretation is more valid, more generalizable than another. That is especially troubling in case studies where numerous, often conflicting, perspectives of various stakeholders interact. Where "*many interrelated parts linked through multiple (often reciprocal, causal) in nonlinear and adaptive ways, and only can be understood by the interactions of the parts and networks*

that connect them" (Schwandt & Gates, 2017). In such context, Vincent and Wapshott (2014, p. 149) argue, we can observe only "*epiphenomena of subjective realities*."

Excitement and challenges. The "escape" from positivism to interpretivism, as well as challenges associated with those worldviews, are close to my heart. I vividly recall my excitement when I replaced my positivist hat, which I had grown accustomed to during my veterinary education, with a fancy new interpretivist hat—associated with the TEL career path I took. The excitement lasted a long time. However, when I started researching complexity of interprofessional, QI-focused learning, I become aware of limitations in the interpretivist stance. Often, I found myself puzzled by questions: How do we use an interpretation of reality to explain mechanisms that are shaping that reality? How do we guide systematic improvement in multi-professional context, where each profession can have separate, sometimes conflicting interpretations? Which interpretation is best? I couldn't answer those questions. My path from positivism to interpretivism is in many ways similar to the journey Ward, Hoare, and Gott (2015) described. Just like Ward, et al, I developed great appreciation for different epistemologies, and an understanding that different questions may need different epistemologies. However, I was unable to find a strong solution for research that has multiple questions and where different questions need different epistemologies. How do I elegantly combine multiple epistemologies? I was puzzled. I thought: there must be better way. Therefore, when I discovered critical realism, I felt—that may be the answer to the methodological challenges I have been experiencing. This thesis will test that assumption.

In the next few paragraphs I will describe important building blocks of critical realism, the complex, nested, and connected nature of our world shaped by relationships and mechanisms.

Relational emergence. Entities in critical realist language are objects or practices. Entities, Elder-Vass (2010, p. 17) explains, are created through relational emergence and each entity is "*persistent whole formed of a set of parts that is structured by the relations between these parts*." Internal relationships between entities create structures. Smaller structures are nested in bigger structures. An example is perioperative surgical team that is simultaneously a subentity of hospital and supraentity of an individual perioperative professional. Therefore, we can analyze entities on various levels of aggregation. As entities are aggregating to create higher-level entities, new features and new powers emerge. Therefore, higher-level entities cannot be presented as a simple sum of smaller entities. For example, perioperative team has emergent features that are different from the sum of features perioperative team members or siloed healthcare systems have. In the same manner, a hospital has many emergent features in comparison with the sum of clinical teams or agglomeration of all hospital staff.

Navigation and interaction between multiple levels. The emergence of new features means that moving from one level of analysis to another may not be easy. Easton (2010) vividly illustrates that by pointing out the vast limitations biochemist and physiologist have when they try to deliver a biochemical model of consciousness. In the healthcare context the same issue manifests as the challenge of moving from reductionist—disease-centered model of care—to holistic, a person-centered model that includes an array of additional social, spiritual, preventive, and developmental formats of care.

On the other hand, to properly understand emergence, we must be aware of history, context, and properties subentities have. For example, emerging powers of perioperative team will be influenced by context (hospital, healthcare system), as well as history and properties individual team members possess.

Upward and downward causation. Various interactions of casual power from different levels further complexicates the picture (Vincent & Wapshott, 2014). For example, changes on a national or hospital level can have downward causation on perioperative teams and their learning practices. At the same time, clinicians as individuals and groups can have upward causation and influence healthcare practices or regulations.

Implementation of team-based care models like PSH are examples where causal powers from various levels interact. The work of Meese and Borkowski (2017) showcases how financial and learning interventions, which on a national and hospital level promote team-based care, might fail due to lack of social capital on a local level. In the case they describe, social capital is impacted by new activities that are rooted in an old mindset. For example, while there is a laudable new trend to publicize hospital quality metrics on websites, instead of reporting quality of the whole team and the complete service patients receive, reporting is often reduced on quality metrics of the head clinician, usually a surgeon. As a result, 1) presented quality metrics show only part of the picture, and 2) the activity promotes the traditional hierarchical physician-centric mindset.

Two types of relations among entities are shaping behavior and powers of emerging entities: necessary and contingent. Necessary relationships define features of the emerging entities and limit variations (Easton, 2010). For example, the relationship between healer and patient is necessary. Without patients who need healing, healers would not exist. In the same manner, patients would be just sick individuals if healers didn't exist. On the other hand, contingent relationships are never inert. They are influenced, activated, and deactivated by various causal processes and they themselves exhibit causal powers. Due to interaction of those two types of relationships, structures are simultaneously invariant and transformative (Sayer, 2010). For example, the healer-patient structure will continue to exist while healer and patients as groups are going through transformative changes.

Mechanisms. Previous paragraphs described the complex, nested, interrelated nature of critical-realist world. That world is shaped by mechanisms, "*deep generative processes and structures*" (Easton, 2010, p. 122) that generate (and explain) specific phenomena. The goal of critical-realist researchers is to discover unknown mechanisms, situations in which mechanisms become activated or deactivated, as well as how various mechanism interacts. While looking for mechanisms, critical-realist researchers know that objective reality does exist. However, it can only be known probabilistically and partially. Therefore, there is no way that things can be absolutely proved or disproved.

Need for multiple epistemologies. The nature of the world and mechanisms that are shaping the world work similarly in social science as well as in a natural science context. There is only one ontology. Yet, depending on research questions, we may need different epistemologies, and often we will need to combine epistemologies.

Our observations and interpretations are prone to error, and social situations are open, complex, constantly evolving systems. We can't rely on one-sided observations to fully understand social situations. Seeing a situation through various theoretical lenses, various epistemologies allow researchers to collect more data and craft additional explanations. Those explanations re-describe the world, so the analyzed phenomena make more sense. That is the process of logical abduction. Findings are "abducted" so they can be analyzed through various lenses. The guiding question is: "*What must the world be like for this to occur or to be intelligible?"* (Mingers, 2004, p. 88). Logical retroduction will follow; the best findings are retroduced (brought back) in the real live context, so we can test them and find which ones really make sense. The process of abduction and retroduction will be used and described in more detail in Discussion (p:179).

Criticism of critical realism. While many benefits of critical realism have been described, critical realism is not without critics. A common criticism is that there is no established systematic method to select between two competing theories (Isaksen, 2016) and how to differentiate between the material and the conceptual parts of reality. Therefore, selection is often shaped by the "*researcher's political standpoint*" (Sims-Schouten, Riley, & Willig, 2007, p. 104). That subjective political standpoint is especially troubling in the context of critical-realist ontology where our society is simultaneously the condition and result of human activity, and human activity simultaneously maintains and transforms our society (M. S. Archer, Bhaskar, Collier, Norrie, & Lawson, 1998). Critical realism is also described as overly complex and theoretical, with very few examples of how to use it in practice (O'Mahoney & Vincent, 2014). For example, Ackroyd and Karlsson (2014, p. 45) noted: "*There is a serious lack of appealing and accessible material on CR-informed methodology to set those new to these ideas off on a path to accomplish interesting and insightful research.*" I see that as a challenge

and an opportunity. My ambition is to create this thesis as an example of practical critical realism.

Critical realism is the framework I will use to analyze data from TA. Description of TA, as well as activity and complexity theory—the two lenses I used to enhance the TA—are presented below. I will also reflect on a few time-consuming errors I made during this research.

3.3.3 Thematic analysis

Thematic analysis (TA) of qualitative interviews is the primary source of insight used in this research. The goal of analysis is to find, analyze, interpret, and report patterns of meaning (themes) within the data and find how the analyzed groups think about QIE, IPL, and TEL (Braun & Clarke, 2006; Joffe, 2012). TA is chosen because it can provide deep analysis focused on my research questions. Simultaneously, it is very flexible method "*not wedded to any pre-existing theoretical framework*" (Braun & Clarke, 2006, p. 81). Therefore, TA could be combined with critical realist ontology and social constructionist epistemology.

The interview process generated interesting and complex data that did not fit predefined patterns. At the beginning I had significant concerns how to present findings from such a data set. TA proved to be a great tool for that task. The theoretical freedom makes TA a good tool for analyzing perspectives of different groups of research participants, finding perspective that aligns and contradicts (Nowell, Norris, White, & Moules, 2017). TA can analyze and summarize big data sets. Finally, TA helped me create a well-illustrated and organized report that is approachable to an educated non-academic audience (Braun & Clarke, 2006). The method works well for applied research (Braun & Clarke, 2014). Since the focus of this research—QIE and IPL—are influencing how healthcare services are delivered, I thought it important to provide this research in a format healthcare professionals can use.

3.3.4 Evolution of research design

This research was originally designed as empiricist case study analyzing how QIE, IPL, and TEL are used by four organizations representing perioperative teams. Phenomenographic analysis, focused on variations of perceptions perioperative professionals have toward QIE, IPL and, TEL, was part of that case study. The idea was to contrast subjective perceptions and objective findings and draw conclusions (as Figure 16 illustrates). However, that choice proved to be challenging:

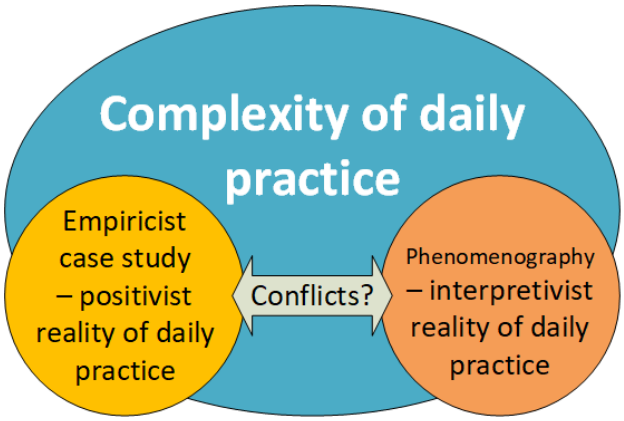


Figure 16. Original research design: contrast between subjective perceptions and objective findings.

- **Scope**. Case studies of QIE, IPL, and TEL practices used by four professional organizations located in a very dynamic political context, in addition to extensive TA (described below), proved to be a significant endeavor that exceeded the scope of this thesis.
- **Phenomenography and complexity**. I found it challenging using phenomenography to analyze highly dynamic and complex systems. Relational emergence as well as upward and downward causation create a system that is closer to the edge of chaos than a system where "*The qualitatively different ways of experiencing a particular phenomenon, as a rule, form a hierarchy*" (Marton & Booth, 1997, p. 132). That challenge is already described in the literature. For example, O'Farrill (2008, p. 202) convincingly argue that "*In many phenomenographic studies there seems to be a lot of uncritical repetition of the fundamental propositions made by Marton originally in the early 1980s and later re-elaborated by Marton and Booth (1997), as the writings of these authors have defined the key traits of the method*." Consequently, many phenomenographic papers claim that during analysis they found how categories of description organized hierarchically. However, quite often it looks like the hierarchies are the result of preconceptions, not the analysis; or it is post-analysis "correction" authors do to comply with the expected standard. Assumptions that we have defined hierarchy and that phenomena can be experienced "*in a relatively limited number of qualitatively different ways*" (Marton, 1981) suggests that we are not analyzing

complex, but simple or complicated system. Findings of this research shed additional light on this issue, and I will discuss it in Discussion (p:198).

3.3.5 Thematic analysis steps

During thematic analysis (TA) I followed the process described by Braun and Clarke (2006). Therefore, my first step was to get familiar with the data. I had a huge data corpus: 151,725 words, 24 hours of interviews. I started documenting thoughts about the data and potential codes and themes while reviewing transcripts before sending them for approval to the interviewees. After that, I did one more read of the entire transcript. With that I was ready to start generating codes. Passages that provided comments about QIE, IPL, and TEL were tagged with short descriptions. These descriptions were grouped into categories based on concepts to which they were referring.

Coding. To optimize the validity of analysis, the categories were created as logically separate and exclusive, and they corresponded to a significant degree with the data from the literature on IPL/QIE and healthcare reform. A unique color was assigned to each category, and an NVivo graphical display was used to track codes and sets of themes (Figure 17). This system helped with cross-referencing codes and estimating the theme.

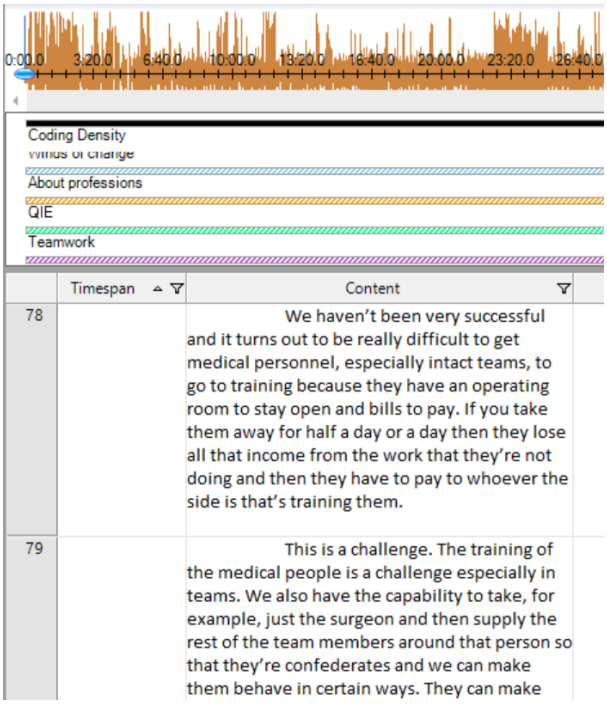


Figure 17. Visual display in NVivo—combining audio, text, and graphical displays of categories.

3.3.6 Complexity and activity theory

Complexity and activity theories provide insight into how learning embedded in a complex system works and how various factors of such a system interact. Therefore, those theories served as lenses that give sharper insight into the TA.

3.3.6.1 Activity theory

Lens to analyze complexity. Activity theory (AT, sometimes called cultural historical activity theory or CHAT) is the third element of the research framework. AT is a descriptive socio-psychological framework taking into account all elements of a complex activity/work system (Johnston & Dornan, 2015). It explains divisions between the material and the mental, history and present, theory and praxis, and—for QIE/IPL and TEL an especially troubling issue—interactions between the individual and the group (Stetsenko, Arievitch, & Blunden, 2014). Examples of such an activity system may be teams like a perioperative surgical home team or organizations such as the ASA. AT can help us analyze interactions among professionals in the system. In this case, those can be doctors, nurses, and patients—and their learning is shaped by interpersonal, cultural, economic, political, and historical aspects (Foot, 2014). Therefore, AT can serve as a lens to analyze collective, culturally mediated, and object-oriented human activities in such a complex and dynamic system (Barab, Evans, & Baek, 2004; Jonassen & Rohrer-Murphy, 1999).

AT is a system-based design. Instead of being a predictive theory, AT can serve better as metatheory or a framework we can use to understand cultural and historical aspects of relations in complex social systems (Iivari & Linger, 1999). Since AT is focused on activity systems, a concept of collective and socially and object-mediated human activity, AT can bridge the gap between individual actors and very complex, socially constructed, and technology-enhanced reality. For example, AT has proven a powerful tool for researching how people adapt and learn in the workplace (Engeström, 2009a; Engeström, Virkkunen, Helle, Pihlaja, & Poikela, 1996).

Map the territory. I use AT because it is a straightforward tool to map (complex) social situations. Critics argue that AT lacks wider explanatory power, and it may be hard to develop theory based solely on AT (Bligh & Flood, 2017; Johnston & Dornan, 2015). However, this research uses additional tools for theory development.

AT allows us to see how we as part of an activity system interact with the system and with the world. Interaction with the world is never direct. We need psychological tools to communicate our thoughts and/or technical tools to physically communicate with the world. A common psychological tool is language. Technical tools are physical artifacts we use in our daily life.

Three generations. The first generation of AT was focused on interaction between individuals, tools, and the object of the activity. The second generation recognized that such interaction is happening in context shaped by division of labor, community, ruled, and history. Figure 18 illustrates the second generation of AT. Arrows illustrate interactions and potential contradictions between elements of the system.

Contradictions are a result of structural tensions between and inside elements of each activity system. Contradictions make the system less stable. On the other side, each contradiction is potential for improvement. Since activities are open systems, a new technology, new process, or new idea that comes from outside can generate a series of disturbances and secondary contradictions. Turbulence created by contradictions (and attempts to address contradictions) provide opportunity for innovation and improvement of the activity; an opportunity for learning. Possibility of activity systems to learn and expansively transform (Engeström, 2009a) makes them learning systems. Therefore, we can describe activity systems as expansive learning systems where learning is created as we are addressing contradictions.

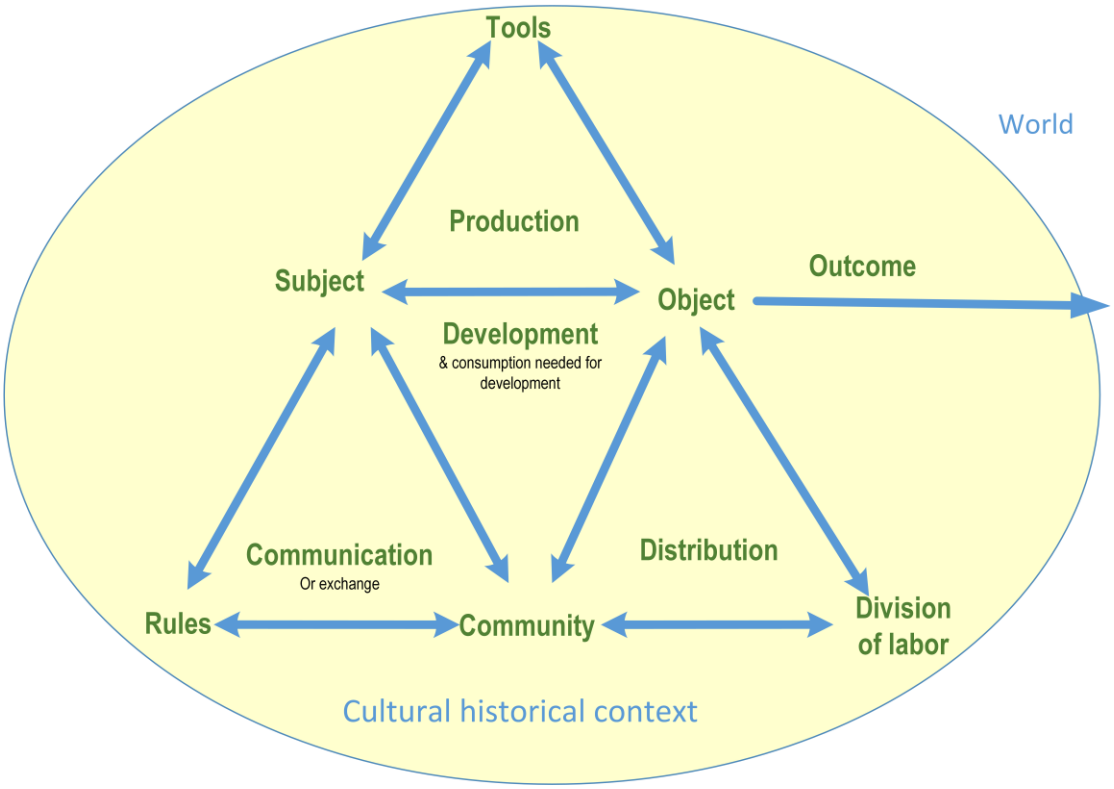


Figure 18. Second generation of activity theory.

Names of the subtriangles. Engeström (2014) followed thoughts of Marx (1993) political economy and labeled activity diagram subtriangles as production, distribution, communication (or exchange), and consumption. I will build on Engeström (2014, p. 114) thought that: "*consumption is also production of the human beings themselves*," and say that consumption is human development. In the other words, in the activity diagram, where

subject, community, and objects interact, they are consuming resources and ideas, so they can develop new skills, new concepts, and new products. In that subtriangle they create a zone of proximal development (Clot, 2009). That process is important for expansion and transformation of activity systems. While consumption is an important part of the mosaic, it is only a prerequisite for development. Therefore, I will name that triangle "Development."

In our perioperative model, the interaction between the patient, anesthesiology, and surgery activity systems may look like on Figure 19Figure 19. Third generation of activity theory. It is an example of the third generation of AT.

The third generation of AT is focused on activity systems in "*network relations to other activity systems*" (Engeström, 2009a, p. 58). Therefore, two activity systems are the minimum unit of analysis. The diagram below illustrates complex interactions inside and between three activity systems in the perioperative context. While creating the diagram below, I followed examples of activity system diagrams presenting complex interactions in healthcare and perioperative context created by *Engeström (2000, 2001, 2009a) and Kerosuo, Kajamaa, and Engeström (2010).*

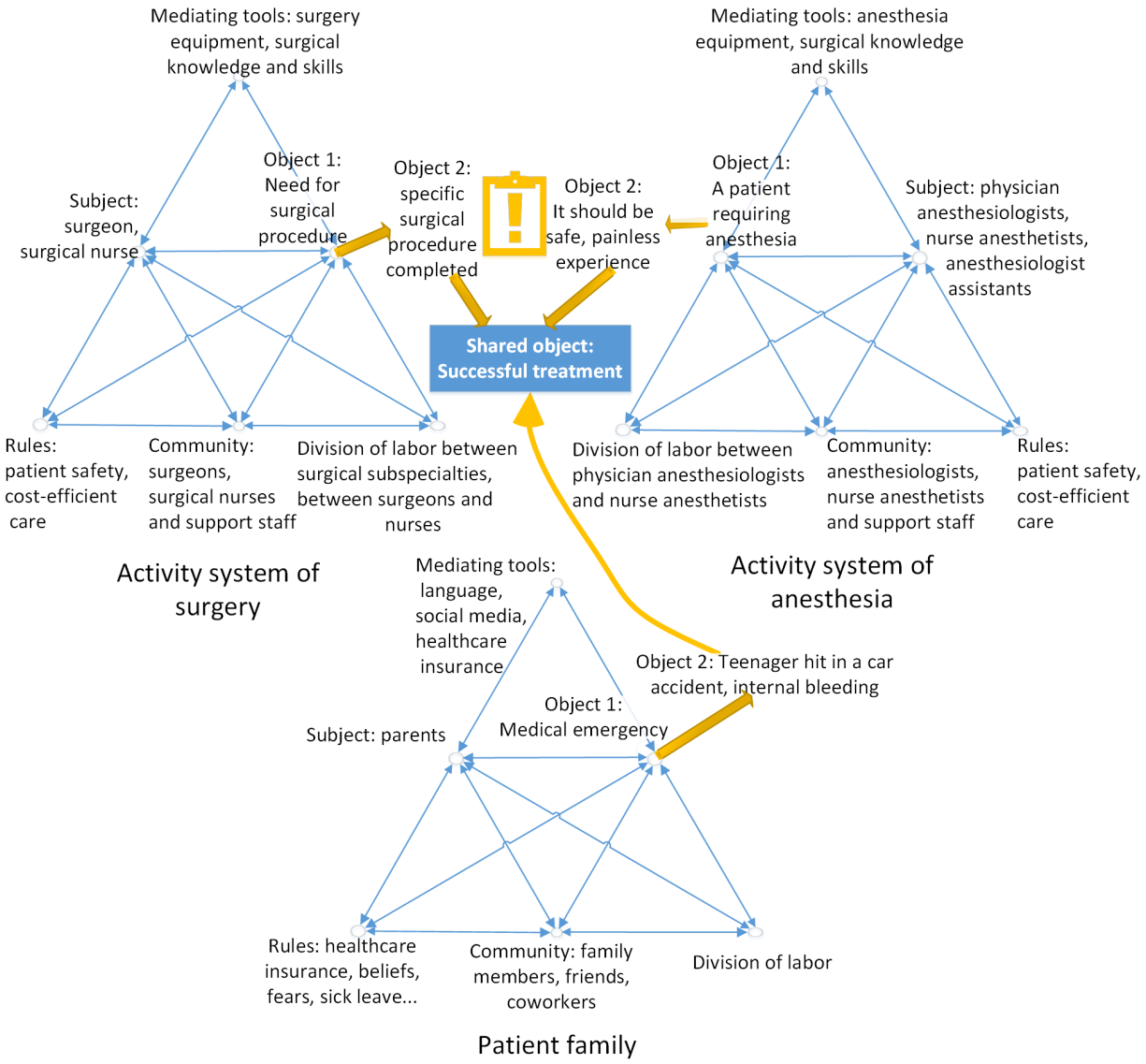


Figure 19. Third generation of activity theory.
The operating room as an activity system for acute patient care (Engeström, 2000, 2001, 2009a; Kerosuo et al., 2010). Each activity system contributes objects: patient in need, successful surgery, successful anesthesia. Those three objects are merged in shared object.

Activity theory and complexity. Since its start the AT has served as a tool to analyze complexity of structures and processes. The triangular model of the first-generation AT redescribed the seemingly direct connection between a subject (providing response) and an object (providing stimuli) and presented it as "*a complex, mediated act*" (Vygotsky, 1978, p. 40). While tackling complexity, the first generation of AT was focused on how an individual interacts with its environment. Second-generation AT extended that by adding community, division of labor and rules to the picture. However, the second generation focuses on just one activity system. Therefore, it serves as a tool to analyze one fragment of our complex reality. That is where the third and emerging fourth generation of AT come in.

The third generation allows us to analyze interactions and contradictions inside and between multiple activity systems. As the number of analyzed activity systems grow, our focus switches from interactions inside the systems toward interactions between networks of activity systems (Spinuzzi, 2014). With that, AT bridges with actor-network theory (Engeström, 2009a) and related complex adaptive systems theory (Kim & Kaplan, 2011), and it becomes a tool that can analyze the complex networked nature of learning organizations (Blackler et al., 2000). As the number of interactions and contradictions grows, the potential for expansive learning increases. For example, the diverse perspectives perioperative clinicians (surgeons, anesthesiologists, nurse anesthetists, anesthesiologist assistants), patients and care givers bring to the table create contradictions, and expands learning potential (Engeström, 2009a).

The fourth generation. Activity-theorists have recognized that the third generation of AT was designed primarily for industrial and agricultural work (Engeström, 2009b; Spinuzzi, 2014). Therefore, they are working on the fourth generation of AT, where the objective is "*inherently multiperspectival, polycontextual*" (Spinuzzi, 2014, p. 93) and delivered through a network of interconnected activity systems. While still in its early stage, the fourth-generation AT is very promising for analysis of processes and structures in networked healthcare, where nodes of various healthcare specialists, patient advocates, patients and their families collaborate on shared objects—health of individuals and population.

During TA, I will use the second-generation activity system diagram to map QIE and IPL concepts inside a perioperative activity system. Other generations of ATs are presented to illustrate the nested nature of our world—where activity systems interact in very complex ways, and where—as the uncompleted fourth generation of AT illustrates—we still don't have a good analytical model.

3.3.6.2 Complexity Theory

Complexity theory is the final piece of the theoretical framework (Gell-Mann, 1995; Kauffman, 1993; Plsek & Wilson, 2001). It serves as a meta-theory that provides insight into how multiple elements of a complex system interact.

Complexity theory is in many ways nested within critical realism. Critical realism is increasingly recognized as a meta-framework used to analyze complexities of our social and natural reality (Cochran-Smith et al., 2014; Gerrits & Verweij, 2013; Mingers, 2014). Therefore, many things described under critical realism (p:73) as learning and emerging properties, and nesting hierarchy of complex systems are also characteristics of complexity theory. In addition to already described characteristics, Bleakley and Cleland (2015) mention the butterfly effect and attractors. The butterfly effect means that a small change may trigger one or a series of mechanisms and initiate significant change of the system. An attractor is a desired goal or desired state the system attempts to achieve. Complex systems have multiple attractors that often conflict. For example, patient outcomes are a mayor attractor driving behavior of a healthcare system. That attractor may conflict with attractors like stability and profitability of the system and happiness of workforce.

The evolution of dominant epistemologies has contributed to the increased awareness of learning complexities. Traditional learning theories like behaviorism and cognitivism were focused on the individual student, usually perceived as a completely autonomous entity separated from the rest of the world, and her potential to “absorb” knowledge (Siemens, 2005). Learning was perceived as a simple, longitudinal content transmission (Jonassen & Land, 2012). During the past four decades, our perception of learning has been transformed. Now dominant constructivist and socio-cultural learning theories perceive learning as an active, social process where, instead of knowledge reproduction, students collaborate on knowledge production, helping one another access and evaluate distributed knowledge. This is a significantly more complex process that involves socialization, identity formation (Cruess, Cruess, & Steinert, 2015), and—in the CME/CPD context important—new course delivery formats (Curran et al., 2010).

Personal and professional epistemologies are an important element of the complexity mosaic. They are processes in which individuals and groups do or do not construct knowledge from learning experiences. Those epistemologies are shaped by learners’ ambitions, interests, capacities, identities, and social structures (Billett, 2009). Because of significant variations of personal and group epistemologies, the impact of a learning event, as a socially-constructed activity, can significantly vary.

Those variations of perceptions are why, in this research numerous participants and numerous professions were interviewed. I will tell more about that in the next section.

3.4 INTERVIEWS

This study analyzed 30 interview transcripts:

- Five anesthesiologist assistants (AAs); two of them with combined clinicians and CPD professionals roles.
- Four surgeons and one CPD expert involved in the education of surgeons. One of the surgeons has extensive experience as CPD professional.
- Eight physician anesthesiologists from the U.S., one from the EU, and three CPD professionals.
- Eight certified registered nurse anesthetists; three with combined clinician and CPD professional roles.

Three interviews I did for my research on perception of IPL among anesthesiologists (Hlede, 2015) provide information that complements this research; therefore, I included them in the analysis. Perspectives from the European anesthesiologist in many ways confirm findings in the U.S.—because perspectives are in many ways similar. However, in a few instances they shed light on differences between EU and U.S. approaches.

Sample size for TA interviews is quite contextual. It should be large enough to understand experiences and perceptions, but small enough that the data is manageable. As a result Guest, Bunce, and Johnson (2006) recommend that a minimum of six and optimum 12 interviewees should be sufficient if a homogeneous group is interviewed. Joffe (2012) on the other hand explains that if the sample has subgroups, and group-based variation is of importance, then significantly bigger sample size (32-80) is needed.

Study participants work together in a perioperative context. Therefore, we can treat them as a homogenous group. On the other hand, there are significant educational, cultural, and hierarchical differences between groups that cast doubt on that homogenous status. As a result, a compromise number of 30 was selected.

The in-depth, open-ended interviews were recorded and transcribed verbatim. The interviews lasted between 22 minutes and 115 minutes. Respondents were encouraged to develop the conversation within each area of interest. In all cases, a state of mutual understanding was achieved (discussion was exhaustive). The variation of length was because of different backgrounds and experiences with the topics of interest. The participants involved in education and leadership had longer interviews than those working solely as clinicians. There are two possible explanations for that: (a) they are more familiar with the complexities

of QIE and IPL, and (b) clinicians, especially physicians, usually give very precise and short answers that, in many ways, mimic the way they communicate in the operating room.

3.4.1 Recruitment

The participants were recruited through references and direct personal contact, mainly through LinkedIn. A few leaders were willing to help me recruit participants. In comparison to my previous research participant recruitment campaigns, references had a much smaller impact. Representatives of all organizations were willing to participate in the research, except the AANA. That was at odds with the fact that the recruitment of nurse-anesthetists through LinkedIn was the most productive.

Nature of the participant group. Only 15% of participants who were contacted, mainly through LinkedIn and email, responded to the interview request. Therefore, it is fair to assume that participants formed a group with a more favorable opinion of QIE and IPL than the general population. In the same manner, the leaders I recruited through institutional channels were selected as leaders in this area. Therefore, the sample may be better characterized as leaders and enthusiasts who are driving the change than as a representation of the general population.

If we assume that the phenomena of interest are static, and the goal is to find average perception, this participant pool made of leaders and enthusiasts may be seen as a limitation. However, this is not the case.

The phenomena of interest are very dynamic, and instead of focusing solely on “average perception,” my primary goal was to gain deeper insight in the phenomena, dynamic, and mechanisms shaping these phenomena. The goal was equality in finding where we are now as where we are going. The participant group made of leaders and enthusiasts was well equipped to help me gain such insight.

3.4.2 Interview questions

The questions below were selected to provide insight in how QIE/IPL and TEL are perceived by perioperative professionals:

- Can you please reflect on your previous experience of working in multi-professional teams?
- How would you describe IPL and QIE? For example, what is the purpose of each? Is it the same purpose?
- What are the differences or similarities?
- How about benefits and challenges?

- Can technology help us address those challenges or enhance the benefits? If yes, how?
- What, in your opinion, are the most important benefits and challenges associated with the perioperative surgical home (PSH)?
- How is PSH related to IPL and/or QIE? Is it related?
- Is there something QIE/IPL-related that members of your profession can learn from other professions?

Since this is a qualitative research, the participants were informed that there are no right or wrong answers (Daly, 2008).

3.5 ETHICS AND RISK

The key to recruiting participants and obtaining successful interviews is to gain their trust and respect. To achieve that, the initial contact with a group or individual included a clear statement of the research goals, format, and ethical considerations. I made it clear that their involvement in the research was voluntary, their participation in the study was anonymous, and that I will present the results in a way that assures confidentiality.

Identity protection. I informed participants that they could cease participation up to four weeks after they receive the transcript, and they can ask that their data be destroyed. The interviews were recorded with a Galaxy 5 password-protected Android smartphone. A few hours after the interview, the audio files were erased from the smartphone. The data were stored in a password-protected and encrypted Google for a business account. The recordings and transcripts were anonymized, and a separate digital file not stored on the computer was used to connect transcripts, recordings, and participants. That measure assured that even in the case of the computer being hacked, the anonymity of participants would be assured.

To assure that anonymity of interviewees was protected, I didn't label extracts used in TA. I was interviewing a group of people that is made of eight small subgroups. Labeled extracts would allow readers to estimate from which subgroup the material was coming. Due to small subgroups, it may be possible to guess who from that subgroup was the author of a particular comment. As literature review illustrates, interprofessional learning is marked with a century of interprofessional conflict. Therefore, extracts presented may be under a microscope.

The ethics for this study were approved by Lancaster University Research Ethics Committee. The ASA Committee on Professional Oversight was informed about the project.

3.6 WEAKNESSES OF RESEARCH DESIGN

In this section, I'll present the potential weaknesses of the research design and my plans to address them. Limitations of the study—which should be considered while interpreting the data—are available on page 204.

Staying focused on a wealth of data. As research analyzing complex, very dynamic phenomena of significant importance to society, this research was created so as to maintain a delicate balance between two opposites: (1) insight into just a fraction of data and (2) too much data to analyze. While, from my perspective, the balance seems to be well established, from the perspective of other stakeholders, a different balance may seem more suitable. Combining the outcomes of this research with the results of similar research is probably the best approach to address this limitation.

Insider research. This research is in many ways an example of insider research. Insider research means that the researcher analyzes his own community or organization (Brannick & Coghlan, 2007). Insider research comes with a few strong benefits and a few challenges (M. J. Greene, 2014). Insider researchers usually know how to navigate their research context; they are familiar with the culture, history, and dominant mental models. Therefore, they usually interact well with the group and have easier access to data. On the other hand, insider research risks being too subjective—where the researcher, for example, can't see the forest for the trees, and can be biased.

Indigenous-insider and indigenous-outsider. Insider research is a very dynamic process, allowing me to utilize some of the benefits and address challenges. As Mercer (2007, p. 1) noted: "*Insider/outsider dichotomy is a continuum with multiple dimensions, and all researchers constantly move back and forth along a number of axes, depending upon time, location, participants, and topic*." That dichotomy was in this research exacerbated by multiple subcommunities involved in this research. Therefore, while talking with CPD professionals I acted as an indigenous-insider (Banks, 1998), somebody who endorses the unique culture, beliefs, and knowledge of that community and is perceived as a legitimate community member. On the other hand, while talking with clinicians I had the role of indigenous-outsider—somebody who is socialized with them, while representing culture, beliefs, and knowledge of educators and researchers. Finally, when I contacted the AANA, the long feud between AANA and ASA (Bendo, 2013; Kane & Smith, 2004; Matsusaki & Sakai, 2011) painted me with the color of external-outsider—somebody who is from a competing community, and as such somebody who could misunderstand and misinterpret their actions (Banks, 1998).

Bias and trustworthiness. As an insider researcher affiliated with the ASA, there is a risk that my personal or ASA bias might influence the research. That may sound worrying—since it is widely accepted that "*All research is subject to research bias*" (Morrow, 2005, p. 254). However, the solution is not to neutralize or ignore the subjectivity and bias, but to properly manage it, and to establish the trustworthiness of the research. I used the classical trustworthiness question created by Lincoln and Guba (1985, p. 290) as a guide: "*How can an inquirer persuade his or her audiences (including self) that the findings of an inquiry are worth paying attention to, worth taking account of?"*

The three main steps I did to manage bias and establish trustworthiness were:

- I documented my assumptions, beliefs, and worldviews—so I can reflect on that, and so readers can understand my background, and audit trail of conclusions delivered.
- During the interviews I took an active interviewer role. My goal was to get insight into how the phenomena of interest are understood by respondents without the influence of my personal perspectives. To do that, in many situations I actively held back my assumptions and theories. In other cases, to provoke more response, I indicated various perspectives and narratives.
- I delivered detailed descriptions of perceptions specific to the perioperative U.S. context, and I described the mechanism that shapes those perceptions.

4 FINDINGS

All meaningful and lasting change starts first in your imagination and then works its way out. Imagination is more important than knowledge.

Albert Einstein

(Sturmberg, O'Halloran, & Martin, 2013)

Key points:

- **IPL, QIE, and TEL related to perioperative teams** are located in a very dynamic context and interact in various ways.
- **Despite various,** in many instances contradictory and chaotic, ways QIE, IPL, and TEL are perceived, all participants agree that it is the way to improve patient care.
- **IPL is a very complex and emerging phenomenon**. While many participants still observe it "from a distance," they are aware that it can have a transformative impact on how perioperative teams work.
- **Perceptions of QIE are shaped by underlying belief of QI**. Therefore, QIE is simultaneously perceived as improvement- and innovation-focused education (improvement mindset) as well as a standardization and compliance endeavor (quality assurance mindset).
- **QIE/IPL exist as a phenomenon**. Participants described various ways QIE and IPL interact, creating a bigger system—QIE/IPL. However, there is no shared understanding how they interact.
- **TEL related to QIE/IPL** is described through conflict of TEL as something needed to address emerging challenges and something that is creating challenges, and TEL as something that can support the status quo and dominance of content-focused education and TEL as something that supports innovation.

4.1 INTRODUCTION

The previous chapter presented research methodology where TA and AT are dominant elements. I explained how I gathered data, the process I used to analyze the data and synthetize answers to the research questions. In his chapter, results of that research effort are presented. The goal of TA is to answer the first two research questions:

- How are QIE and IPL, and their interaction, perceived by four groups involved in perioperative teams (anesthesiologists, surgeons, anesthesiologist assistants and nurse anesthetists) and their CPD providers?
- How do perioperative professionals experience the TEL that underpins QIE and IPL?

Four complex phenomena. To provide answers to the first two questions I will conduct TA of QIE and IPL as separate phenomena; I will analyze phenomena created by interaction of QIE and IPL; and I will end with TA of TEL modalities that impact QIE and IPL. In total, that is analysis of four phenomena. As analysis will show, each phenomenon acts as a dynamic open complex adaptive system. Each of them has noticeable internal complexity. And they interact with each other as part of a complex learning healthcare system (LHS).

In the chapter that follows, Discussion, I will build on findings presented in this chapter to provide answers to the third and final research question:

- What are the implications for perioperative care and future professional development of these findings?

For each phenomenon, a thematic map was created. Thematic map presents interrelations between codes, themes, and phenomena. It is a graphical representation of how, based on the data gained from interviews, understanding and perception of each phenomenon vary, and how they interrelate. Thematic maps are usually presented as a mind map, a hierarchical, radial tree graphical presentation of information. In this paper, I used nested Venn diagrams (Radcliffe, 2010). They are better tools to present various multidirectional, clustered, and evolving relationships between phenomena, themes, and codes.

Activity system. IPL and QIE proved to be complex phenomena influencing all six elements of socio-technical activity system that forms the perioperative team. For example, IPL will allow clinicians (subject) to better learn and work together (tools and concepts) and deliver better healthcare (object). Such a change can have significant impact on social context (community), convention and rules used, as well as division of labor. Participants described how the hierarchical, siloed, mechanistic mindset is being replaced with a more collaborative, connected mindset that is better suited to address complexity or healthcare delivery—ultimately showing how all elements of the system are being transformed.

To better analyze relationships between various elements of IPL and QIE that were described in this TA, I will use the second-generation activity system diagram.

On the other hand, QIE/IPL, and TEL, as described in the interviews, did not show such strong and direct connections with elements of activity system. Both phenomena can be perceived as extensions of QIE and IPL. Analysis of QIE/IPL was primarily focused on interactions between QIE/IPL and the mere existence of that emerging phenomenon. Analysis of TEL, on the other hand, was focused on TEL related to QIE and IPL. Therefore, I didn't use activity system diagram for those two phenomena.

4.2 PHENOMENON 1: INTERPROFESSIONAL LEARNING

IPL proved to be a complex, socially constructed phenomenon that challenges many established norms. Consequently, participants described 24 vivid codes. Interactions between codes are complex, in many situations contradictive. As the thematic map (Figure 20) illustrates, those codes form five themes:

1. IPL is a learning delivery method
2. IPL is a benefit
3. IPL is a challenge
4. IPL is a project we must implement
5. IPL is lost in time

There is a noticeable contradiction between themes *Challenges* and *Benefits*, and theme *Project we must implement* suggests that those contradictions should be addressed.

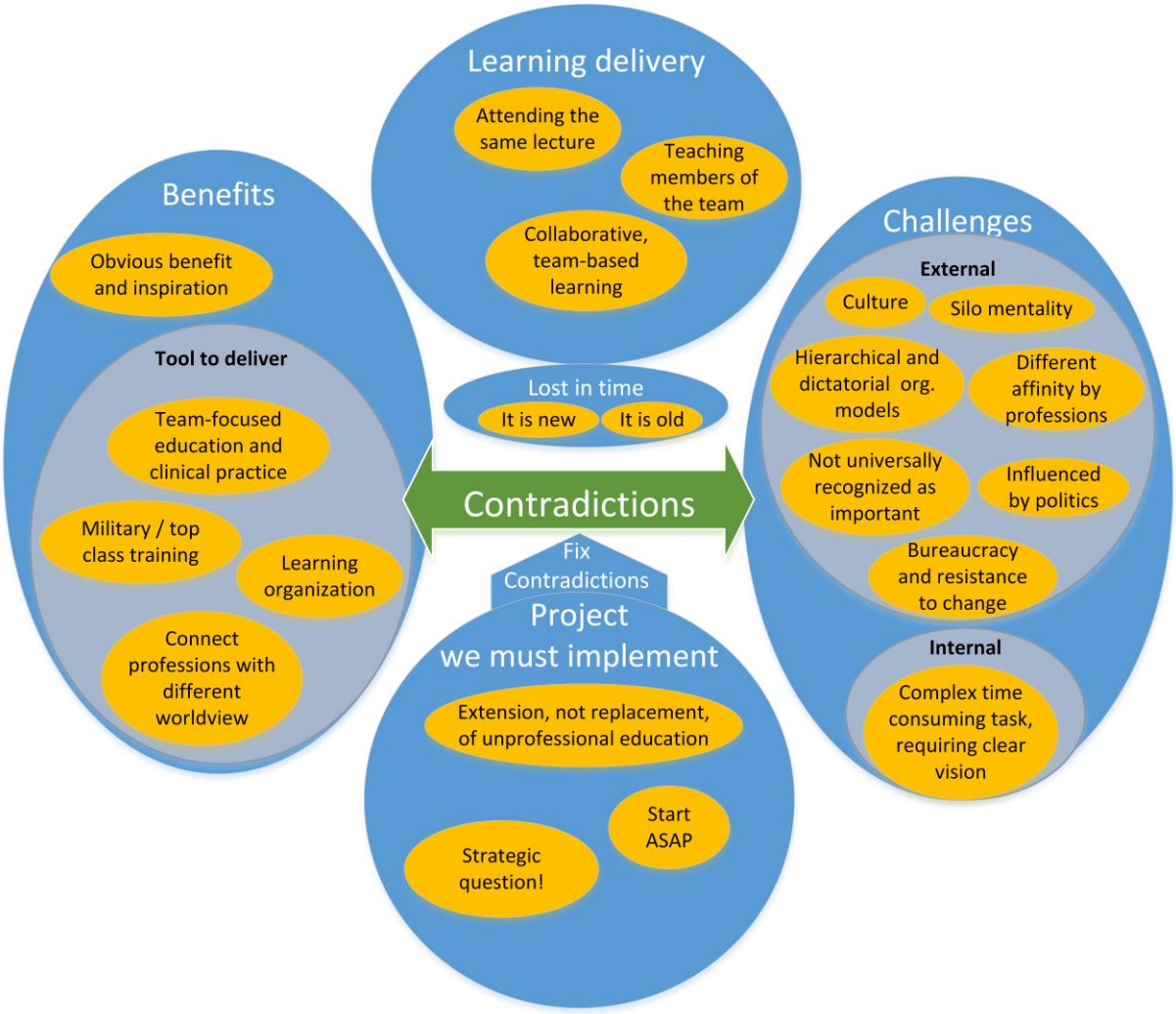


Figure 20. IPL thematic map

IPL as learning delivery method

Perception of IPL as a learning delivery method *among participants varies from attending the same lecture with other professions, to teaching other team members about things important to your role, and finally—learning designed by the team for the team.*

IPL as attending the same lecture

Didactic lessons with a multi-professional audience are described by a few participants as a very basic but legitimate way to deliver IPL. For example:

> *At a very basic level, [IPL] could be then where an anesthesiologist and an anesthesiologist's assistant attend a CME conference and they are learning alongside each other at the same time.*

While attending the same didactic lecture may not meet basic requirements of IPL (CAIPE, 2002), a CME/CPD conference is much more than didactic lectures, and didactic lectures can be combined with social, interprofessional activities. Therefore, each lecture can be seen as a didactic component of one bigger social and networked learning-enhanced conference. Interprofessional discussions and networking that happens during, before, and after a lecture can transform the nature of that lecture. A few participants expressed enthusiasm about that potential, usually by adding that additional social aspects of live CME conferences would be beneficial. For example, while referring to live meetings with didactic lessons, one participant noted:

> *I think having [didactic] education together is very important because that allows the people to communicate together at the same level...*

The activity system map (Figure 21) illustrates how that seemingly minor change in perception reflects quite a significant change in the activity. A traditional content-focused lecture causes small contradictions in just upper “production” triangle, where learners use the lecture tool to gain new information. That modality got quite a lot of criticism as a passive, credit-focused exercise. For example, as one participant explained:

> *[CME learners] are getting CME credits for sitting time. …[while] They are doing crossword puzzles.*

Another explained:

> *…and I think a lot of it is just because CME is a requirement. You get doctors who are doing it to check that off their list. They're not actually involved or engaged in what they're learning.*

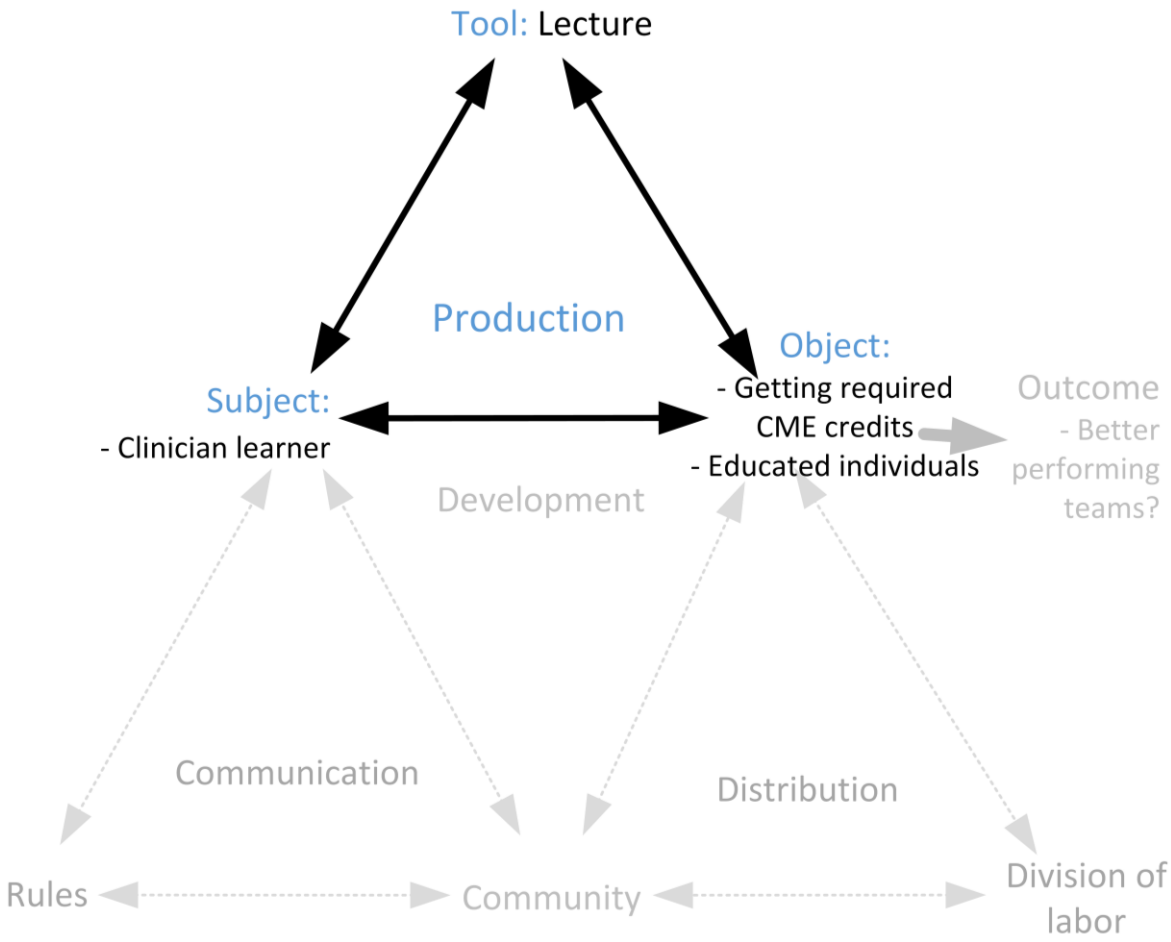


Figure 21. AT map—lecture.
Grayed elements are not active in this model.

On the other hand, if the lecture is perceived as part of a live meeting, an event that provides opportunity for community development and networking, then the map becomes significantly different—as Figure 22 illustrates. Community and networking—as a form of participation in the community—immediately becomes part of the picture. We can use community to enrich Subject and enhance Object. That opens the possibility of changing the rules and division of labor and improving communication and distribution knowledge. This perception aligns well with findings of Lassmann and Cornaglia (2017) that learning associated with CME conferences/congresses is (p. 70): "*ongoing conversations between professionals and their extended networks, rather than activities that happen only during the congress*."

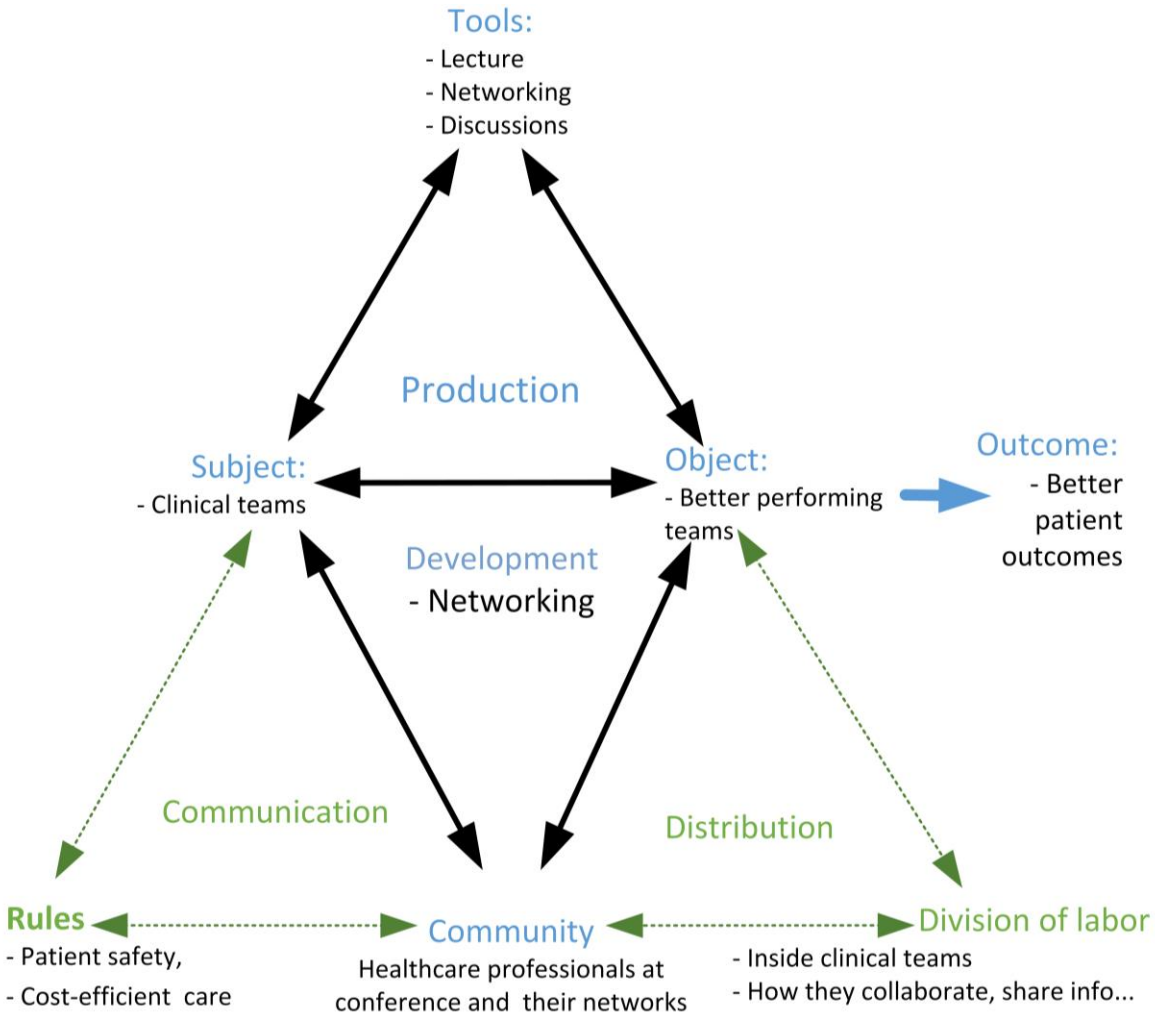


Figure 22. AT map—live CME conference.
The green elements (rules and division of labor) are not necessarily involved in this mode—but they can be.

This illustrates how the perspective we take—a worldview we have—can have a transformative impact on how we perceive, and secondary to that, how we design lectures and CME conferences.

IPL as teaching members of the team

A second, less ambiguous code in this theme is IPL as teaching members of the team. Collaboration with team members, and informing them about ways they can support your tasks better, is seen as a form of IPL that can be practiced daily.

> *For example, an anesthesiologist educates internal medicine and surgeons what is important for us, to optimize the patients, and therefore minimize the number of cancellations.*

This viewpoint can be presented as a bridge between a traditional content-focused teaching model (one teaches, others listen), and collaborative interprofessional learning. Figure 23 illustrates this model. Subjects and members of the community exchange ideas and

perspectives so they can better address the object. The object is a better-performing team and trust between members of perioperative teams.

Better understanding of perspectives other team members may have, and trust among team members, are seen as an important building block of a successful team.

> *So, I think having an understanding from an anesthesiologist what a surgeon is trained to do, how they're trained and educated to provide a joint replacement… Learning about them and it grows the team, it builds the bond, it builds the trust between the team.*

When perioperative team members communicate well and are on the same page, they have new tools available: They share ideas and have open communication, and, if needed, they can improve rules and division of labor (green), further improving the object—better-performing teams.

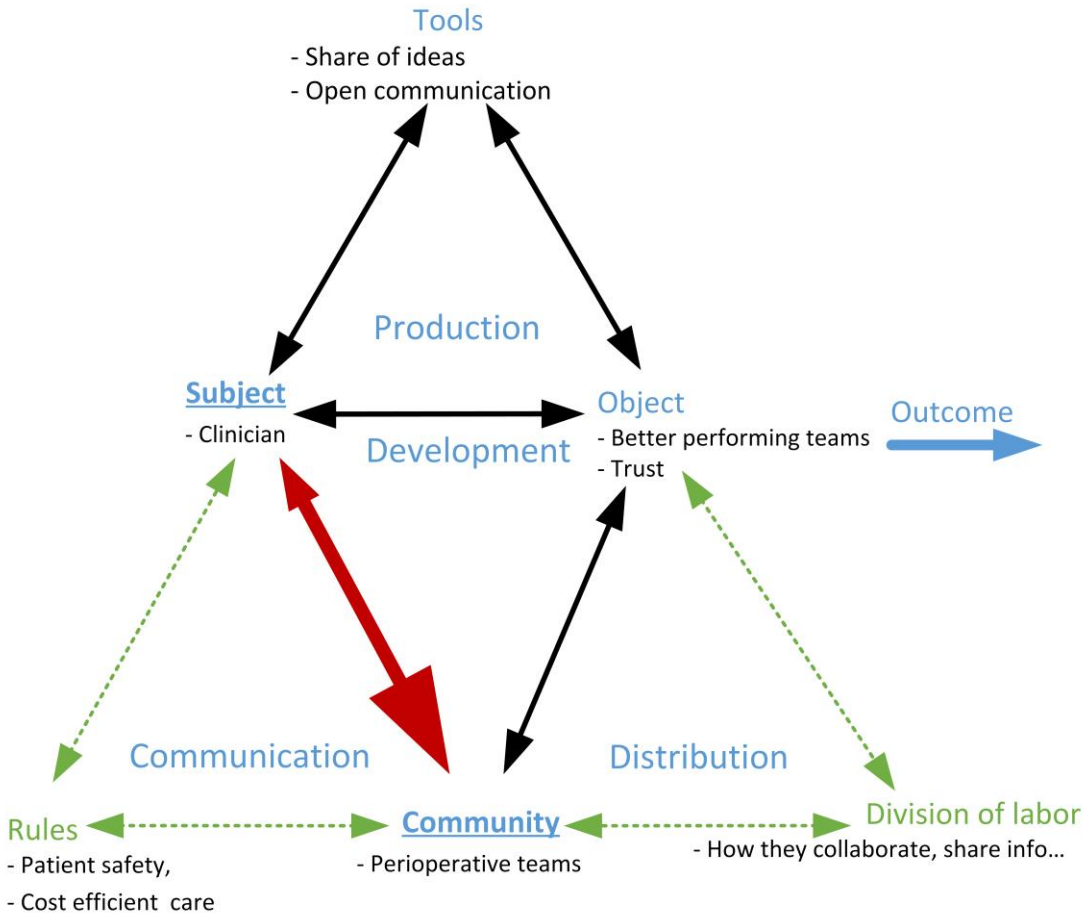


Figure 23. AT map—teaching members of the team.
Teams learn how to work better. They can improve division of labor, rules, and trust among team members.

IPL in this model opens numerous possibilities to improve performance of perioperative teams, and it is quite easy to implement. Yet it is perceived more as communication between team members than systematic approach to team-based learning. Therefore, it may be prone to issues of hierarchy and one-way communication. The red arrow (Figure 23) illustrates that

more communicating may be going from individual to community than vice versa.

A systematic approach to team-based learning is the next code.

IPL as a well-designed, collaborative learning activity planned by the team for the team

Approximately half of participants described full-featured IPL as a collaborative endeavor designed by the team to benefit the team.

> *[IPL] would be education planned by the team for the team. It's getting everyone's viewpoints, input into what content and education activities. Should we consider everybody's needs? … Reaching out across all branches of medicine to work together for the best outcome for the patient.*

This model raises contradictions and gains benefits from all elements of the system. An important feature of this model is that subject and community are fully engaged. They are actively, to their fullest potential, collaborating to properly address object. Therefore, rules and division of labor can be reshaped (Figure 24).

In comparison with didactic lectures (or attempts to describe didactic lectures as IPL), we see shift from learning as production to learning as development. Didactic mindset sees learning as a tool to achieve simple, measurable objects. That process is located in the Production triangle. On the other hand, IPL as a collaborative endeavor designed by the team for the team is located primarily in the Development triangle. In that triangle, subject and community help each other, and they expand the zone of proximal development. From there, subject and community together can reshape all other elements of the system. Therefore, this model can serve as a framework for well-planned systematic development—development that can transform the system.

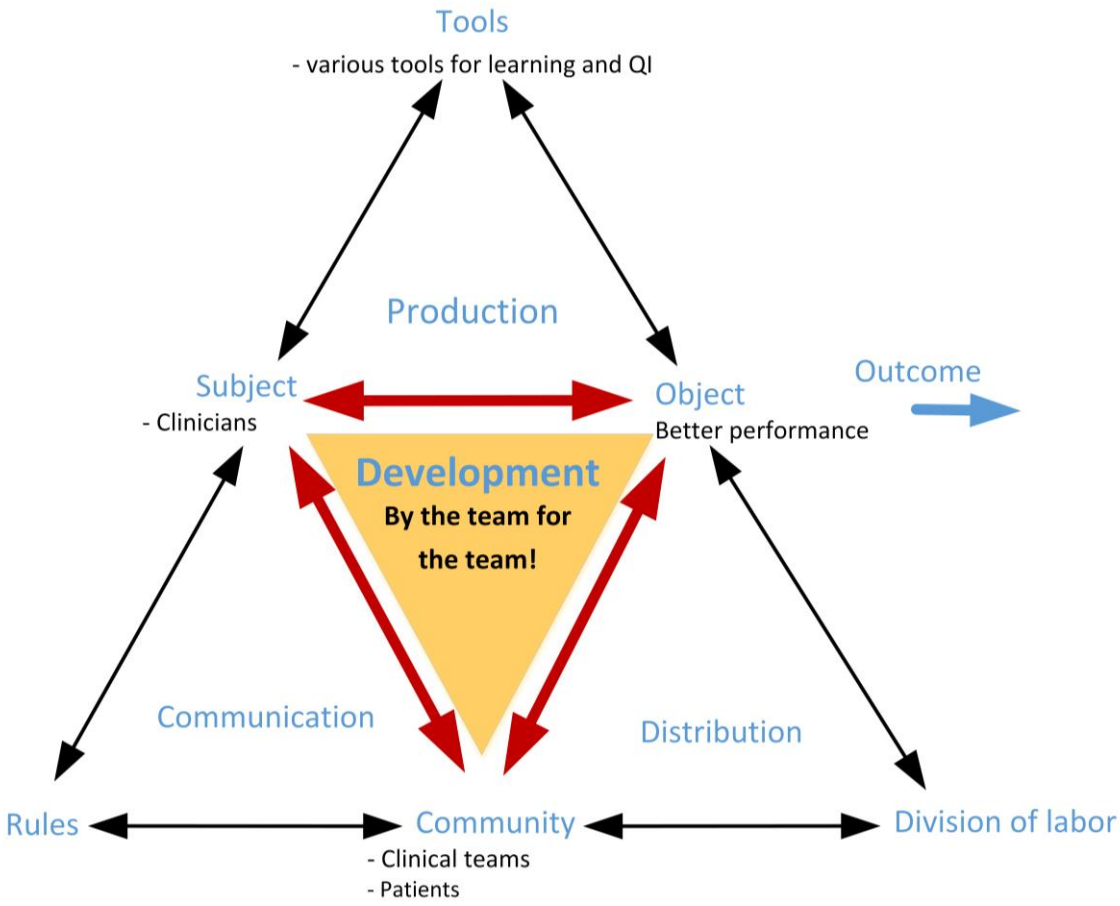


Figure 24. Activity theory model—full-featured IPL.
As it starts from the central, development triangle, it has easy connection with other elements of the system. That makes it possible to transform the system.

In summary, this theme explores the progression from didactic formatting that has some elements of IPL, to formats that exhibit all elements of successful IPL. An important discovery is that live CME/CPD conferences, usually perceived as a series of didactic lectures, are very often much more than didactical. Live CME conferences provide opportunities for networking, collaborative interprofessional learning, and strategic planning. In other words, they can have transformative power of IPL as learning designed by the team for the team. Enhanced by technology, CME/CPD conferences can defy the traditional spatial, temporal, and uniprofessional limitations of CME/CPD conferences.

This theme described a few models to deliver IPL. The following theme will shed additional light on why delivering IPL is beneficial.

4.2.1 IPL as a benefit

IPL as a benefit was the most powerful/popular IPL theme. All participants in one way or another perceive IPL as a beneficial phenomenon. That perception scales from simple acknowledgement that it may be beneficial to very enthusiastic description of IPL as something that will boost teamwork, help break silos, and make a huge transformative impact on healthcare.

Two codes and five subcodes define IPL as beneficial. Those are:

- Obvious benefit and inspiration
- Tool to:
  - Implement team-focused mindset
  - Connect professions with various worldviews
  - Create learning system/organization
  - Achieve military-like efficiency

Subcodes provide insight into how IPL is helping us. After I put that on the AT map, it becomes obvious that IPL benefits exist in the upper triangle, primarily as a tool.

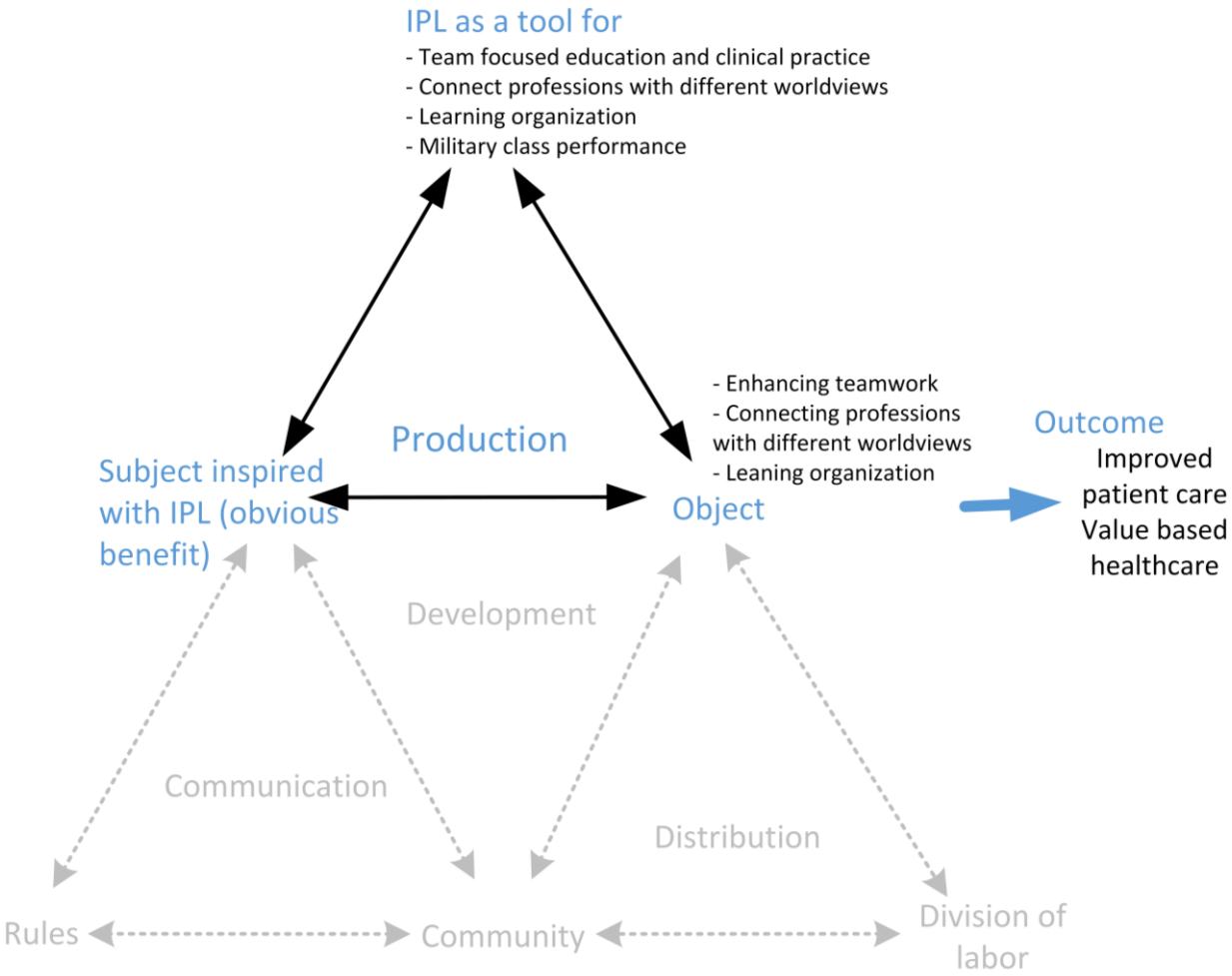


Figure 25. IPL benefits on AT map are in top triangle.
Greyed parts of the diagram are not active for this theme.

4.2.1.1 IPL as inspiration with obvious benefits

Participants described IPL as an inspiration, with obvious benefits; it is something they believe in. And while they could elaborate on why they believe in IPL, it is obvious that their belief is deeper and much more multi-dimensional than a mere list of benefits they associate with IPL. It seems that IPL—as a tool that supports better coordinated, more harmonious and more humane ways to work and help patients—has an impact not just on practice, but also on practitioners and their beliefs.

IPL is a socially constructed activity, rooted in ideas of collaboration, trust, and sharing. Those concepts are close to our hearts and an emotional tone is often noticeable. The emotions vary from concern that such a complex social construct may be hard to maintain (one participant) through modest enthusiasm (majority of participants), to highly enthusiastic statements like:

> *I think that interprofessional education is critical. …I believe in interprofessional education and, in fact, I'm on fire! I've got it on my desktop, on my laptop, the report that came out by IoM, and then the other one that came out in May…*

Many participants augmented that intrinsic, altruistic belief that IPL is a beneficial solution by description of benefits it can help us achieve. Through that lens, IPL looks like a robust toolset.

4.2.1.2 IPL is a tool

IPL is described as a tool to achieve four outcomes: 1) establish team-focused mindset, 2) connect professions with various worldviews, 3) create learning system/organization, and 4) achieve military-like efficiency.

IPL is a tool to implement team-focused mindset

Need for better teamwork in preoperative setting was a common theme. While well-coordinated teamwork is perceived as the optimal way to deliver good, safe, and affordable healthcare, participants were not always certain that is the case. Some interviewees described teamwork in their unit as very good, but others noted that while teamwork between a few professionals in the operating room may be good, overall, healthcare is "*delivered in silos*." IPL is perceived as a tool that will help bridge that gap. With that, IPL will allow healthcare organizations to transform how perioperative teams learn, and help prepare clinicians to deliver coordinated team-based care. Without such training, clinicians may work together, but never achieve the benefits of strong teamwork.

One participant vividly described that challenge:

> *American patient probably thinks that this [team-based healthcare] is really being delivered, and I laugh every time I see commercials on TV that talk about personalized team-based medicine... Obviously, we know that that's really not going on.*

Addressing education gap. While successful healthcare delivery is perceived as a well-coordinated, team-enabled, socially constructed concept embedded in a very complex context, continuing education is very often delivered as short, isolated courses built around simplistic content plus multiple-choice questions model. That quite drastic ontological and epistemological discrepancy is seen as a big challenge affecting healthcare. IPL is described as a tool that will help education/learning match needs of healthcare teams working in a complex healthcare environment.

> *[IPL] is critically important. You've heard the cliché that healthcare is a team sport? Surgery is a perfect example of that.*

Reduction of the clinical teamwork gap will happen when we address educational teamwork gap:

> *If we want professionals to work in a team environment, this has to start in the classroom by inter-disciplinary training.*

Value-based care as a model where multi-professional teams manage the complete care cycle for a specific group of patients is built around successful teams (Porter & Lee, 2013a). Therefore, IPL is perceived as essential to delivery of value-based care.

> *I think that interprofessional education's going to be absolutely essential in the changing healthcare environment in the United States, as we move toward more value in care delivery and a more coordinated, team-based care that's going to be necessary for us to achieve the goals of healthcare reform in the United States*

One participant explained that various levels of "teamwork" exist. Therefore, often we confuse a group of coordinated professionals with teamwork. For example, while we may talk about the surgical team in an operating room, very often not much teamwork happens there. He vividly compared that with a baseball team made up of individual stars:

> *An operating room is much more like a baseball team. A bunch of people happen to be there; but it's individual expertise. It's not about teamwork. Crossing over that barrier into true teamwork first of all requires everybody understanding that they have to leave their uniforms at home.*

IPL is a tool to connect professions with different worldviews is described as something that can enhance learning and clinical practice. One participant explained.

> *And, when you work with another colleague from another discipline—a nurse and physician—because we have different roles and different perspectives, there will be something that one person would have perceived as an issue that another professional would not have seen. … Physicians come from a different ontology, a different role in perspective that is unique. And when you combine the efforts and different viewpoints you actually come up with something that's better than the individual viewpoint.*

There is need for more productive interaction between worldviews various team members bring to the discussion. Challenges with worldviews that are not so open to collaboration, and lack of insight in ontological and epistemological differences are noticeable. For example, while almost all participants were aware that there are different worldviews and cultures among professions, most of them were unable to articulate those differences. For example, one anesthesiologist explained:

> *It's very hard for me to explain, because I don't get it. How nursing schools teach students to think is very different than how medical schools teach students to think. There's a huge difference in language. The practical [clinical] stuff is all the same… I don't understand the nursing theoretical model so I can't present it as well, but it derives from a very different educational theory.*

Different ontologies and epistemologies. Nurses and anesthesiologist assistants seem to have better awareness of differences between ontologies (worldviews). One possible reason may be that the medical culture perceives a reductionist positivistic quantitative approach to healthcare practice, education and research—sometimes referred to as evidence-based medicine (EBM)—as the gold standard (Miles & Asbridge, 2013; van Baalen & Boon, 2015). Therefore, medical culture historically has not been very interested in alternative approaches. On the other hand, nursing, which takes a more qualitative, more humanistic approach, had invested considerable effort into defining and defending its worldview (Playle, 1995). As result, they are more aware of ontological and epistemological differences between professions.

IPL is a tool to create a learning system

A few participants described the potential for IPL to increase the learning abilities of teams and organizations—ultimately developing them as a learning system. Trust, collaborative knowledge development, data sharing, and combination of different worldviews are the main processes to achieve that. For example:

> *I think a non-physician can bring forward information, new research they read or something, to a physician who may not have had the opportunity to read that. They can learn from that person, just like a physician can bring research that they've read that maybe the other provider they work with has not read, and bring that and raise the entire performance level of the entire group.*

Coincidentally, no interviewee mentioned a learning healthcare system. It may look odd that discussions about learning modalities focused on learning of whole teams/organizations and QI did not mention the term "learning system." The reason may be that the dominant view of a learning healthcare system (LHS) as provided by the Institute of Medicine (IoM, 2007, 2011) is very technocentric. In comparison with the original version of learning organization

theory, LHS theory has been significantly watered down (Wyer, Alves Silva, Post, & Quinlan, 2014). Positivist and empiricist epistemology promoted by EBM serves as the main building block of that system. Such a technocentric and asocial approach to a learning system is at odds with IPL as a solution for complex, contextual, culture-driven, value-laden learning (Greenhalgh & Russell, 2009).

IPL as a tool to achieve military-like efficiency

The military is perceived as a very successful, very focused organization and model organization that uses IPL. Two participants explained that the interprofessional approach to training is an essential factor that makes the military such a successful model.

> *Yes, especially because in the military, when we deploy, we have to work as a team, so we all have the same training.*

The IPL approach to military training starts at the beginning. The goal is to create a shared mental model for all levels of military personnel. However, that is at odds with healthcare culture. Therefore, both physicians and military as organization must invest considerable effort to bridge that cultural gap.

> *In fact, doctors in the military are a big challenge. It's a huge challenge to both the doctor and the military, because the cultures are so very, very different. Which is why, if you are a doctor in the military, you start in a six-week course, how to put on a uniform…*

What can we learn from the military? The military, like healthcare, is very structured, hierarchical, and technologically advanced; yet in the military, poor performance can be literally fatal for staff. In addition, military personnel are almost as a rule salaried employees (goarmy.com, 2018) of one company, the government. In medicine risk associated with error, and payment model are different. Errors of medical teams, the third-leading cause of death in the U.S., account for 134,000 to 400,000 deaths a year (Makary & Daniel, 2016). Yet, when healthcare errors happen, the lives of healthcare professionals usually are not endangered. Finally, Zuvekas and Cohen (2016) report that the majority of physicians are still paid through fee-for-service models, a model that promotes more services, not better services. Table 5 illustrates main differences between healthcare and military model.

	Military	Healthcare
Nature of industry	Structured, hierarchical, technologically advanced profession	Structured, hierarchical, technologically advanced profession
Can be fatal	For the professionals and people they protect	Only for the patients
Compensation	Salaried employment	Primarily fee-for-service
Training is usually	Interprofessional	Uniprofessional

Table 5. Military and healthcare—system comparison.

In summary, variations of perceptions paint IPL in a very pragmatic manner—as a tool to deliver palpable benefits. Simultaneously, in a more general and theoretical manner, IPL is perceived as benefit per se. Underlying message of many: We work and learn better together—therefore building bridges between professions and learning together is inspirational.

4.2.2 IPL is a challenge

IPL is often perceived as a challenge mainly due to numerous barriers that are impeding implementation of IPL. Those barriers are mainly external, like culture and politics. A few internal challenges, like complexity and difficulty to implement and maintain, can be related to external challenges. For example, difficult implementation might be caused by the complex nature of the project, as well as various obstacles external to IPL.

While many participants described significant challenges that might slow down implementation of IPL, they all think that IPL is in their future.

IPL challenges include:

- External:
  - Cultural issues
  - Silo mentality
  - Hierarchical and dictatorial organizational culture
  - Bureaucracy and resistance to change
  - Politics
  - Not universally recognized as important
  - Different professions have different affinity
- Internal:
  - A complex, time-consuming, hard-to-implement format that requires clear vision

All those challenges are external or created by external forces. On Figure 26, challenges are located in the bottom "Rules ⇔ Community ⇔ Division of Labor" social/collective area. Therefore, those are primarily system/societal issues. Since IPL is challenging many established norms, the system/collective is resisting the change and attempting to maintain the status quo.

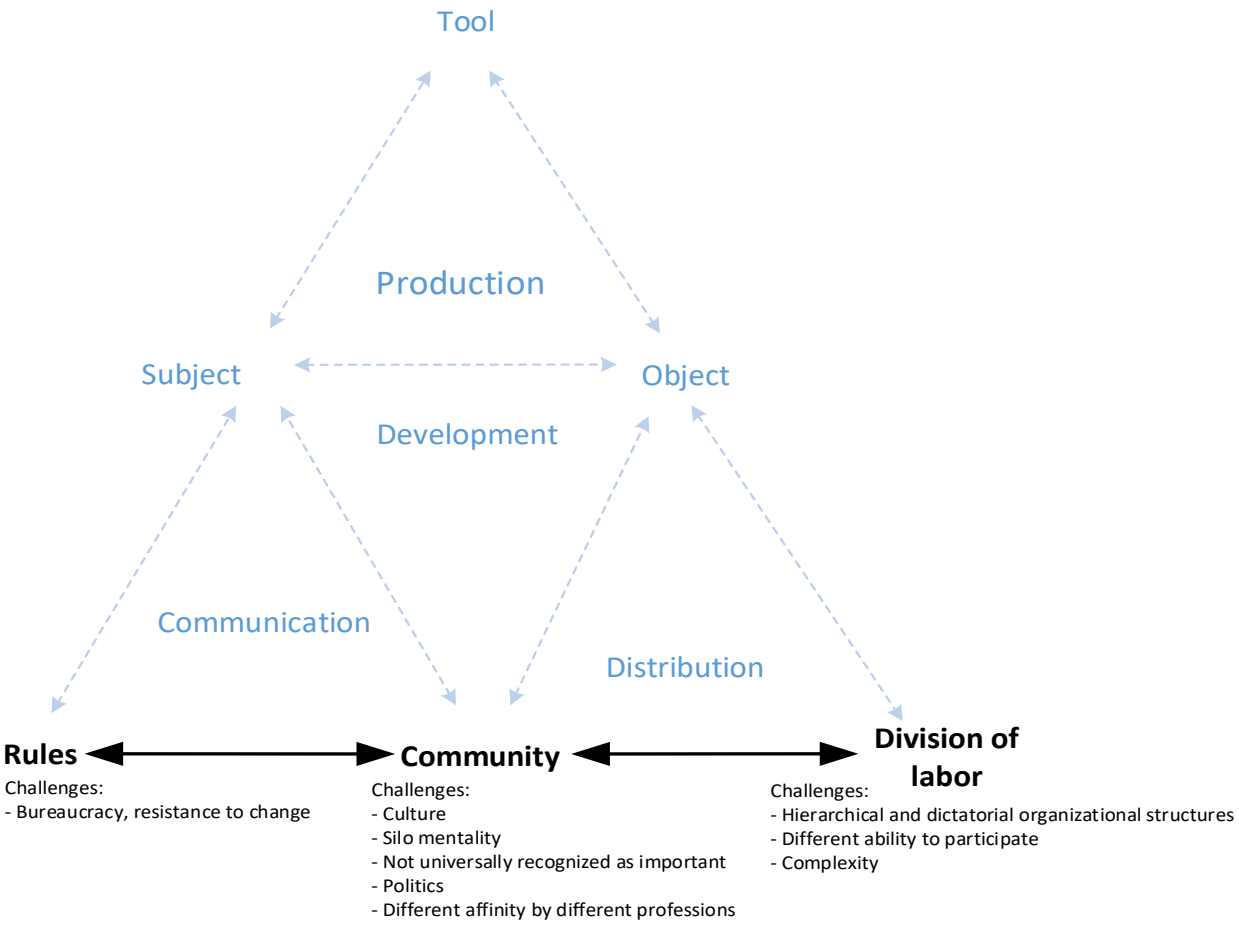


Figure 26. IPL challenges—affecting the social/collective base of the activity system.

IPL is obstructed by cultural issues

Various cultural factors are mentioned as potential barriers to IPL implementation. Historically, medicine has been a male profession while nursing was predominantly female (Gjerberg & Kjølsrød, 2001). While that stereotype has slowly changed in the developed world, historical consequences are noticeable. Furthermore, some team members come from very conservative cultures. One participant explained a worldview (not his own) that could cause friction on the team: "*At best, women should be nurses, or otherwise they should be at home and not working at all*." Another issue may be interaction among cultures where collaboration is done differently. As mentioned before, the unique worldviews that different professions bring to the table can be the basis for productive, innovative collaboration. However, the same differences may be source of conflict: a clash of cultures.

> *There are many other cultural and social interactions that are underlying things of interprofessional education, and I think those are challenges.*

IPL is challenged by silo mentality

As extension of the complex socio-cultural issue known as silo mentality in healthcare (Paige et al., 2014; Woolf, 2007), some participants noted that professions are sometimes not open to studying together. For example, an anesthesiologist noted:

> *Physicians are not going to want to be trained with nurses, nurses may not want to be trained with physicians, and administrators don't want to be trained with physicians and nurses, and physicians don't want to be trained with administrators.*

As one example of silo mentality, some interviewees mentioned the unwillingness of physicians to work on committees with nurses:

> *In order for us to be able to offer nursing credits, we have to have a nurse planner on all of our committees. Well, it's not that easy to get the doctors to agree to have a nurse on their committee."*

Silo mentality and IPL have an interesting relationship that in many ways follows the logic of mutual exclusivity. Silo mentality, as many interviewees noted, prevents successful IPL. Simultaneously, IPL is known as a tool to address silo mentality (Paige et al., 2014). Therefore, we can expect that during implementation of IPL we will have to do an initial push to address silo mentality. After that, IPL will minimize the effects of silo mentality and the system will stabilize.

IPL is challenged by hierarchical and dictatorial organizational structures

Healthcare, as a high-risk, well-regulated, and stratified industry has a long history of strong and quite static hierarchical structures (Bleakley, Bligh, & Browne, 2011). While in many industries, through CPD and hard work, professionals can progress from assistant, professional, manager and then to CEO, or from teaching assistant to lecturer, associated professor, and then to professor, in healthcare a move to a different role is much harder. For example, anesthesiologist assistants need four years of medical school and about four years of residency to become an anesthesiologist or surgeon. Such static structures and large differences between authority levels can create hierarchies that can metastasize into models where professionals with master's-level education (nurse anesthetists, anesthesiologist assistants) might be required not to think critically, but simply to obey orders (Weiss, Kolbe, Grote, Spahn, & Grande, 2017).

For example, the "captain of the ship" mental model (Achor & Ahn, 2014) assumes that the surgeon is the person who makes all decisions and everybody else follows orders. That model is recognized as a security issue that might allow fatal errors to occur (S. H. Price, 1989; Reiling, 2016). The same mental model can have a crippling impact on IPL, where a more egalitarian approach is needed (Schuetz, Mann, & Everett, 2010).

> *The challenges are to kind of dismantle the old traditional lines of communication, which were hierarchical and dictatorial. With the surgeon at the top of the pyramid, and giving information and instruction down to all the other subservient members of the team.*

One surgeon explained that challenge:

> *At the American College of Surgeons, teamwork is great as long as I can be the captain of the team. If I can't be the captain of the team, I don't want to be on your team.*

While in a specific clinical context team structure and hierarchy are important, that structure should enhance communication and empowerment of all team members. Therefore, in a clinical environment we can have successful models that combine hierarchy and collaboration (Merry, Weller, & Mitchell, 2014). However, if we attempt to transfer hierarchy of that model in the IPL context, hierarchy might minimize many of benefits we expect from IPL.

In the same manner, cloning hierarchical structures from the operating room to other healthcare contexts might cause significant challenges. As a system becomes more integrated and more complex, it is important to recognize different roles and team structures participating in various stages of perioperative care (Whyte et al., 2017). For example, while during surgery surgeon might have the highest authority, her involvement in the post-operative period might be minimal:

> *[Surgeon] has to realize that the captain of the ship or the person who's ordering the care is not necessarily going to be with the patient [after surgery]*

IPL as something different professions have different affinity

A surgeon experienced with interprofessional project-based learning explained that different professions have different abilities to participate in collaborative interprofessional learning.

> *The nursing students were the most active, the most interactive and the most open in our interprofessional classes and the medical students and fellows were the worst. Then the other professions.*

This perspective aligns well with comments that exposed the different ontological and epistemological backgrounds medicine and nursing have. Medicine is still rooted in positivistic, reductionist “there is only one objective truth” worldview, and epistemology that favors hierarchy of evidence, medical hegemony (Coombs & Ersser, 2004), and where we should avoid complexity and uncertainty (Haidet & Stein, 2006). On the other hand, nursing has long experienced critical, postmodernist thoughts, and various theories that help address complexities of collaborative healthcare delivery and education (Alligood, 2014; Booth, Kenrick, & Woods, 1997; McCrae, 2012; Playle, 1995); and those theories are part of formal nursing curricula. Consequently, medicine, at least from an historical perspective, is less prone to engage in collaborative and interprofessional learning activities than nursing.

This looks like an area where medicine can learn from nursing (For example: Parse, 2004; Yancey, 2015). A few physicians explained that they don’t understand nursing theory. For example, while reflecting on his advisor role for nurses engaged in PhD and Doctor of Nursing Practice programs, one physician leader noted:

> *I'm a very good adviser to them around the science. Power analysis, inclusion and exclusion criteria, and how to interpret results from clinical trial, and how to present data. I can help them a lot with that, but half of their thesis has to be about their educational framework and how their hypothesis fits in this framework. I don't understand any of that when I read it.*

IPL is not universally recognized as important

Lack of recognition is a barrier to IPL implementation. Many participants said there is a noticeable difference in how importance of IPL and QIE are perceived. As one participant noted, "*Quality improvement is something that everybody knows is very important.*" Such consensus does not exist around IPL.

IPL is a learning method heavily influenced by politics

Along with individuals' perspectives, IPL perceptions shaped by professional organizations play important roles in enabling or limiting implementation of IPL. As one surgeon said:

> *In its strictest sense, the American College of Surgeons' definition of inter-professional only includes professions that come underneath them in a supervisory role. [Traditionally, it] did not include nurses because nurses don't have anything to do with the American College of Surgeons. It did not include anesthesiologists because anesthesiologists don't have anything to do with the American College of Surgeons.*

It is fair to assume that such a perception had influenced perceptions of surgeons, and as the surgeon noted—it has limited potential interprofessional learning projects with anesthesiologists and nurse anesthetists.

In the same manner, two nurses mentioned that policies of the American Association of Nurse Anesthetists do not reflect the collaborate nature of the nursing profession.

IPL is obstructed by bureaucracy and resistance to change

Bureaucracy and resistance to change seem to be mutually reinforcing agents. Extensive bureaucratic procedure to get accredited for interprofessional credits, as well as pre-prescribed education delivery format (McMahon et al., 2016; Whitehead & Lacey-Haun, 2008), make it hard to deliver successful IPL. Consecutively, there is a limited number of stellar IPL programs. As a consequence, the shortage of successful IPL examples motivates people to stick with the old rules—further promoting bureaucracy and resistance to change. For example, one clinician noted this barrier to successful IPL implementation:

> *I think bureaucracy, I think egos, and basic stubbornness and unwillingness to change.*

Two CPD professionals explained that CME culture and ACCME accreditation practices are focused primarily on prescribed practices—the process, less on outcomes.

> *With the ACCME … there's so much focus on the process and not the outcome. It's all focused on, "Well, did you check these boxes? Did you have this conflict of interest? Did you do the disclaimers? Do you have learning objectives?" It's not so much on the outcome for the learner…*

This process-focused approach raises an old strategic dilemma: Are we doing the right things, or are we doing things right? Drucker famously explained the importance of that question: "*There is surely nothing quite so useless as doing with great efficiency what should not be done at all*" (Drucker, 1963, p. 57). Yet, it is fair to believe that very often we very efficiently do wrong things. In the 1963 paper, Drucker noted how accounting concepts are focused on efficiency, not effectiveness. Similarly, in the ACCME case, accreditation criteria seem to be focused on efficiency, not effectiveness. Consequently, in the ACCME context the fundamental confusion between effectiveness and efficiency; confusion between "doing the right things and doing things right," can become standard.

In the recent years the ACCME has taken big steps to address this issue and create "*accreditation standards that inspire—not constrain—CPD provider organizations*" (McMahon, 2017, p. 268). ACCME is promoting philosophy of freedom and encouragement to innovate and develop new learning modalities (McMahon, 2016, 2017). Simultaneously, a joint accreditation process, developed jointly by accrediting bodies for physicians, nurses, pharmacists, physician assistants, and optometrists, is becoming more popular and the process is more straightforward (jointaccreditation.org, 2018). With that, CPD providers can innovate and can be accredited for interprofessional education without extensive paperwork. That is an opportunity for CPD providers; and a task to abandon historically constraining practices and strategically embrace new possibilities.

The following code illustrates the scale of that task.

IPL is a complex, time-consuming, hard-to-implement task that requires clear vision

IPL is perceived as a very complex phenomenon that may be influenced by a whole array of factors. While addressing a specific factor or group of factors may be an achievable task, being able to address all challenges that arise from that complexity may be hard to achieve task. One surgeon explained some elements of that complex challenge set:

> *Time, cost, access, coordination, audio-visual, making sure that people understand the same vocabulary, people who may not understand some statistics. So, those, I feel, are some barriers.*

Having enough time to address the new task is critical. Members of all four professions involved in the research mentioned lack of time as the biggest barrier. From the perspective of professionals who are increasingly exposed to regulatory burden, with burnout rate estimated at 30%-40% (Dyrbye & Shanafelt, 2011), IPL may be seen as a new, unnecessary distraction.

> *The problem is that we're all very busy. I think it's hard to get a few people at the same time, to do the same thing. That's the biggest challenge.*

Therefore, IPL has to be embedded in a larger, clearly presented QI strategy or vision. That big-picture vision will help team members understand the value of investment in IPL. Without the big-picture approach, team members will dedicate the majority of their energy toward their professional silo, and protection of that silo.

> *"The teams that work the best are the ones that share a common vision... So if you have a leader who has a vision and can share that vision with the group, the group does better. If the leader really does not have a clear vision, then the group is just working day to day but they're not really going anywhere."*

A few participants expressed the need for a big-picture, visionary approach as an important characteristic of emerging coordinated, value-based care. Therefore, awareness of need for a vision is rising with time. Whether we are talking about a vision of team, a vision of IPL, or a vision of an individual patient, all stakeholders have to be on board.

> *So, all professionals have to think more about the big picture than about their little picture. Ten years ago, in anesthesia, I was thinking, did I give the antibiotics on time? The surgeon was thinking, does the patient have an infection? But what really matters is did they get the result from the surgery they wanted?*

Leadership practices in organizations follow the same trend. Leaders invest effort in creating and sharing a common vision. However, complex, multilayered structures of professional organizations can easily dilute the vision or create multiple, in some cases conflicting, variations of the vision.

> *I think if you go to the very, very top, [the chief officer in the organization] would love to have a shared vision. …but I think that the forces at the next couple of levels down are centrifugal, not centripetal. No, I would have to say that in theory there is a shared vision, but in practice—there are multiple, multiple shared visions.*

Implementation of IPL is a complex, political, emotional, cognitive, and professional identity change. Therefore, being able to connect IPL with organizational vision and mission can be helpful.

In summary, perception of IPL as a challenge is associated with various external, mainly societal factors. However, challenges are perceived as tasks we should address, not as problems that will perpetually prevent implementation of IPL. That brings me to the next IPL theme—IPL is a project we must implement.

4.2.3 IPL is a project we must implement

As a continuation of discussion of benefits (why IPL), challenges (things we must do before implementing IPL), participants presented IPL as a set of tasks we must implement. The dominant messages are: we can build on existing structures; this is a strategic issue; and we should start working on it ASAP.

IPL as something we must start implementing ASAP

Since implementation of IPL is a major undertaking, influenced by numerous complex social factors, participants argued that it should start at the undergraduate level. One of the important steps may be establishing connections between different healthcare professions schools. For example, Cleveland Clinic and Case Western Reserve University are building a medical campus where two medical schools and nursing and dental schools will be located in the same building (Roviner, 2016).

Two participants explained that:

> *I think the earlier you start interprofessional training or interprofessional discussion, the better… maybe has to start at the undergraduate level [by building campuses where healthcare students can] learn together instead of having separate medical schools, nursing schools, pharmacy schools, dental school…*

> *Wouldn't it be great if we actually had classes with the nursing students when we have shared curriculum? Or even doing it—a lot of medical school curriculum is case-based. They're trying to make it more real and more fit to the clinical situations, so you're learning what you need to learn, but it's still just the medical students. What if we did that in combination with the nurses? That would be cool.*

IPL as a strategic question

IPL is a complex social phenomenon. Although we can argue that as a format of experiential and social learning (Olenick, Allen, & Smego, 2010), IPL is the natural way humankind has always learned (Boyd, Richerson, & Henrich, 2011), it contradicts many established healthcare norms and beliefs—especial ones related to industrialization of healthcare (Rastegar, 2004), medical hegemony (Coombs & Ersser, 2004), and positivist "there is only one truth" worldview. IPL affects what clinicians, educators, and institutions believe and do. Therefore, most participants think that IPL can be successfully implemented only as part of a larger, well-coordinated strategy. Taking a more prominent role in development of that strategy will be beneficial for everybody in the system.

> *IPL is a strategic question for the ASA. I happen to believe that we will enhance our role in the house of medicine if we expand our efforts to teach others. From medieval times the purpose of the guild is to teach the guild members, to keep the knowledge secret, but I think that's counterproductive.*

IPL as an extension, not a replacement, of uniprofessional education

While some participants have a very enthusiastic view of IPL and believe that it will become the dominant learning format, a majority of participants view it as an extension of uniprofessional education, something that will complement and enhance it. In that context, uniprofessional and interprofessional learning are important links in the chain of lifelong learning. Therefore, instead of arguing which link is bigger, we should make certain that each link is strong enough—because a chain is as strong as its weakest link. IPL is one of the weakest links in the current educational system. If the link remains weak, graduates will, due to limited ability for interprofessional teamwork, have a reduced impact. At the same time, we should not try to disproportionately increase size of IPL link and make other links weaker. Some things are uniprofessional and we should not change that:

> *There are certain things that should be learned in individual domains…*

4.2.4 IPL is lost in time

Previous themes exposed a large variety of concepts and emotions associated with IPL. Theme IPL as a learning delivery method showed variations of how IPL can be delivered and how our worldviews can transform the way we see established learning practices. Themes "benefits" and "challenges" exposed (somewhat emotional) contradictions between intrinsic benefits IPL can deliver and extrinsic challenges blocking implementation of IPL. Those contradictions culminate with a theme that describes IPL as something we must implement. I will wrap up this analysis with a small theme that provides a simple yet powerful argument about ambiguity surrounding IPL: There is no consensus how old IPL is.

This theme is made up of two contradictive codes:

1. IPL is a new phenomenon
2. IPL is an old phenomenon

Some interviewees are aware of the relatively long IPL history, while others perceive it as something that was initiated very recently. This variation suggests that IPL, although not official part of the curricula, has been latent for a long time.

IPL is an old phenomenon with a long history

A few participants noted that IPL has a long history. Historical examples of IPL include phenomena like Advanced Cardiac Life Support courses—where all clinical staff attends the same course, various IPL initiatives some schools implemented during the last half of the 20th century, and a few subtler examples with very long histories:

> *There are some examples of it that go way, way back by culture. For instance, every medical student learns how to wash their hands for surgical*

operations, how to put on a gown and gloves, and scrub and remain sterile, from an operating room nurse.

IPL programs have existed transiently at various schools since the 1960s, but interprofessional education programs are growing…

IPL is a new, emerging phenomenon

Another group of participants described IPL is something new that recently started booming**.**

I think IPL is actually just coming to the fore in the last five years.

That discrepancy of opinion seems to be caused by IPL's status in different contexts, and the different backgrounds of interviewees:

- **Context**. IPL may be practiced in one context, but not in another. Examples may be residency programs where anesthesiologist and anesthesiologist assistants are trained together vs. programs where nurse anesthetists or anesthesiologists are trained uniprofessionally.
- **Background of interviewees** affects:
  1) Their insight in IPL practices from 10-30 years ago (generational differences), and
  2) Criteria they use to categorize something as IPL or not.

Senior leaders can recognize rudimentary examples of IPL from 20-30 years ago. On the other hand, younger professionals, in addition to not being familiar with old examples, have higher criteria to categorize something as IPL. Examples older generations may recognize as IPL—younger generations would not consider to be IPL.

4.2.5 Mapping IPL themes in activity system

Variations of IPL perceptions draw a picture of a complex phenomenon—where conflicts between benefits and challenges (reasons for and reasons against) play the dominant role. All participants presented benefits and challenges, and everybody believes that we are going in the direction of addressing those challenges. However, there is no consensus on how, how fast we will get there, and how the IPL of the future will look.

Descriptions on an activity system diagram provide a map as on Figure 27. The map shows that codes from theme benefits are located at the top of the diagram—under tools. Challenges are located in the bottom Rules ⇔ Community ⇔ Division of labor line. Addressing those challenges will create strong foundations for successful IPL. *Themes Project we must implement* and *IPL as education designed by the team for the team* are located in the development triangle—suggesting that only through intensive interaction between subjects and community can sustainable change be achieved.

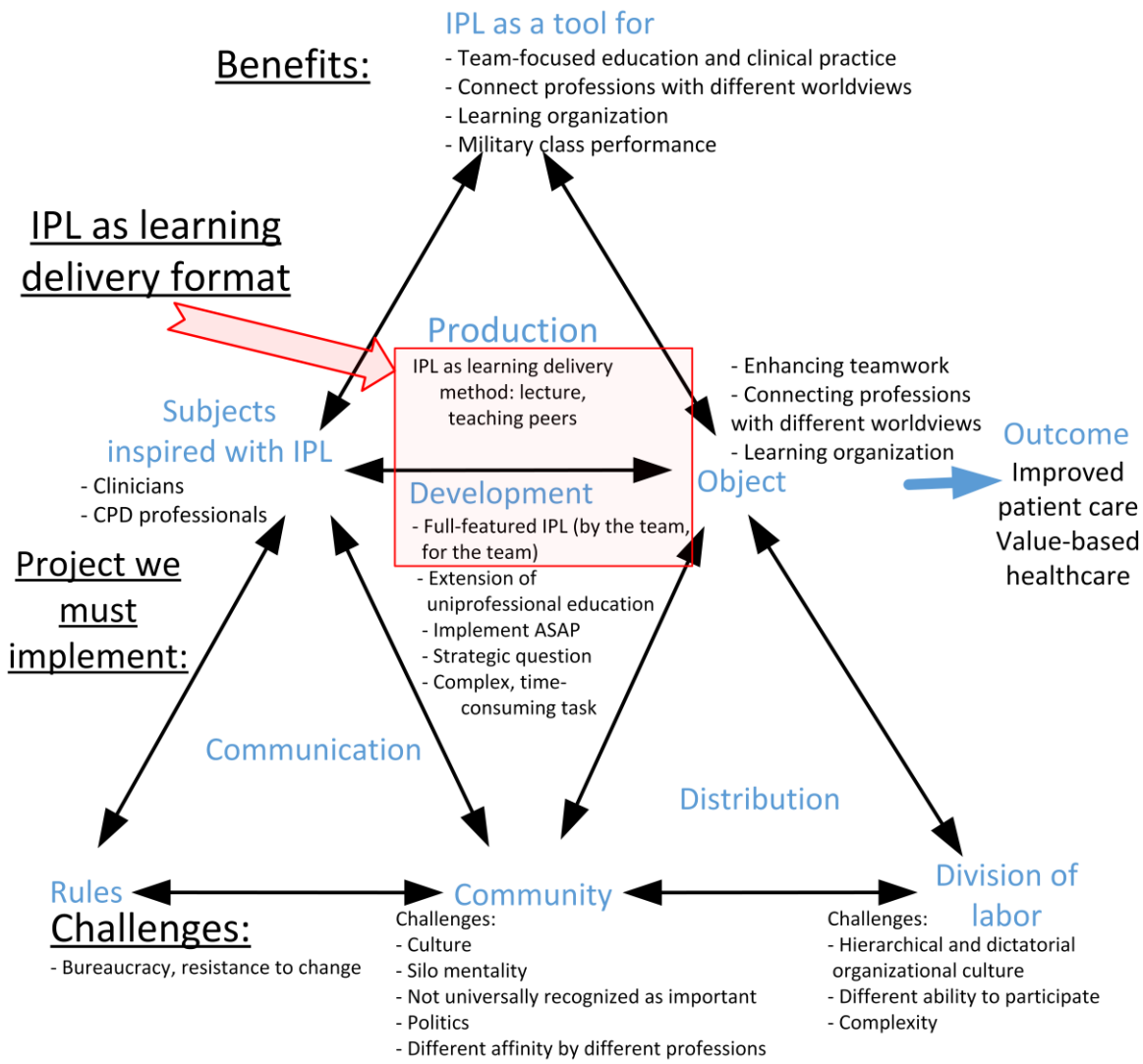


Figure 27. IPL mapped on activity system diagram.

4.2.6 In sum

The thematic map, as well as the location of IPL perceptions on the activity system map, illustrates complex phenomena that impact all elements of the system. IPL is associated with noticeable contradictions between perceived benefits and challenges associated with IPL. Therefore, implementation of IPL will require significant effort. Simultaneously, the improvement and expansive learning we can achieve will be worth that effort.

4.3 PHENOMENON 2: QUALITY IMPROVEMENT EDUCATION

Quality improvement education (QIE) is the second stakeholder in the QIE/IPL complex. In this section, I will focus on themes describing perception of QIE, while in the following section (p:129) I will discuss how the system created by interaction between QIE and IPL is perceived.

In the literature we find three views of QIE. The ACEHP describes QIE as an educational framework that connects all stakeholders in joined learning and QIE enterprise (Diamond et al., 2015). That very interprofessional view of QIE is often contrasted with the description of QIE as education about QI. Finally we have performance/quality improvement CME, a learning format prescribed by the AMA (2017) in 2004. Performance Improvement (PI)-CME 20-hour course guides individual learners through a linear three-phase process (learning about, implementing, and assessing QI intervention). While it is designed as performance/quality improvement activity, its short, linear, and usually uniprofessional nature and focus on implementation of established standards limit the ability of PI-CME to address complex healthcare challenges (Vakani & O'Beirne, 2015).
In short, we have a vision of an impactful framework that may exist in the future, and two approaches that are just touching on the complexity of quality improvement in healthcare. Those are very different concepts. Therefore, I was expecting that perceptions of QIE might be variable and vague.

To ease navigation through themes, in this section, I first describe the nature of the phenomena and interaction between themes. Themes are presented after that.

This is what I found:

QIE in many ways acts as a bridge between QI and IPL. Descriptions provided by participants show that association with QI gives QIE instant approvability. QI is a strong, positive brand—equally for participants familiar with QI as for participants who are not familiar with QI. Therefore, QI opens many doors; and QI successfully shields QIE from criticism, whether it is unneeded destructive criticism or needed constructive criticism. It is hard to say no to QI(E). Simultaneously, instant recognizability of QI can strip the “education” from QIE. To illustrate that I use the abbreviation QI(E). In more than a few descriptions, differences between QI and QIE were completely blurred, and QIE was presented as QI. Merging of QIE and QI adds an additional layer of complexity. Perception of QI varies widely, from a bureaucratic and punitive system that penalizes errors to a system focused on innovation and improvement. Consequently, while everybody agrees that QIE is important, there is no agreement on what it is.

Figure 28 illustrates what—based on the interview data—QI, QIE, and IPL look like from the average public perspective. QI is the most prominent and most popular element. A careful viewer notices IPL, as part of the complex. Yet QIE seems to be hidden behind QI.

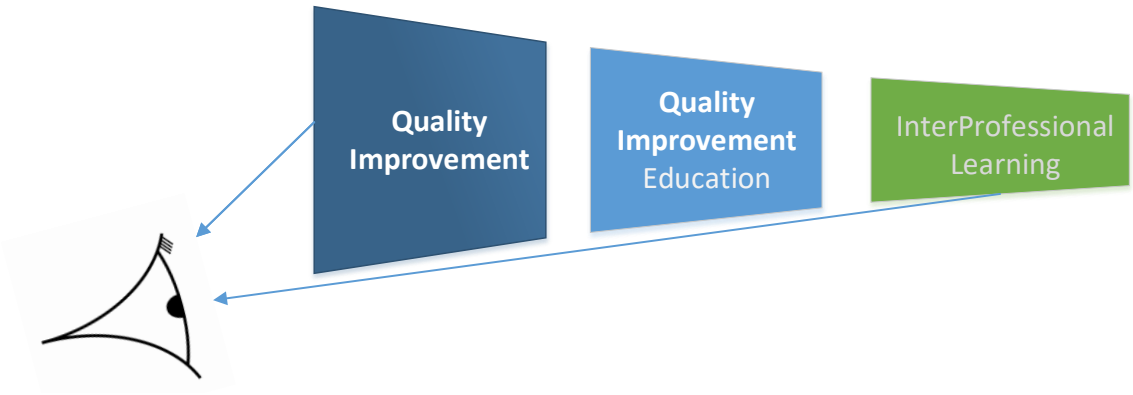


Figure 28. Public visibility of QI, QIE, and IPL.
QIE is overshadowed by various strong and sometimes conflicting perceptions of QI.

Agreement about importance. Participants confirmed the importance of QIE with comments like this:

> *Quality improvement is something that everybody knows that is very important*

> *I think [QIE] is lacking in medical education.*

Different perceptions. While everybody agrees that QI(E) is important, perception of QIE varies significantly, primarily in dimension of what it is, and secondarily in dimension of how much people are aware of it (or how much they believe they are aware).

I noticed quite significant differences in how clinicians and CPD professionals perceive QIE. Clinicians usually associate QIE with various situations where QI interventions happen, while many CPD professionals consider QIE a very specific and (still) quite rare learning format.

QIE for CPD professionals is often perceived as a specific educational product—PI-CME. PI-CME follows the strict Performance Improvement Continuing Medical Education format prescribed by the American Medical Association in 2004 (AMA, 2017). It is a product many of them don't have experience with. Only 0.4% of accredited CME/CPD courses are focused on quality/performance improvement (ACCME, 2016; McMahon, 2016). Therefore, it is understandable that many CME/CPD providers don't have sufficient experience with that concept, and that their default description of QIE might be:

> *To be honest, I really don't know much about quality improvement education at all.*

Vivid images of QIE for clinicians. On the other hand, clinicians have more experience with QIE, but mainly indirectly, through QI. Clinicians are lifelong learners entrusted to do activities that affect human lives. They are well aware that they have to maintain quality of their

services as part of their social contract (ABIM, ACP-ASIM, & EFIM, 2002). In one way or another they have experienced learning that is *associated* with QI, and they have participated in some form of QI activities (Kitto et al., 2015; Wong, Etchells, Kuper, Levinson, & Shojania, 2010). Therefore, although their perception of QIE may vary significantly, they can describe very vivid images of that phenomenon.

QIE themes. Clinicians and CPD professionals described QIE with codes that can be grouped in four themes:

- QIE as a derivate of QI and other related concepts
- QIE as a source of benefits
- QIE as a source of challenges
- Rare learning delivery format

The thematic map is:

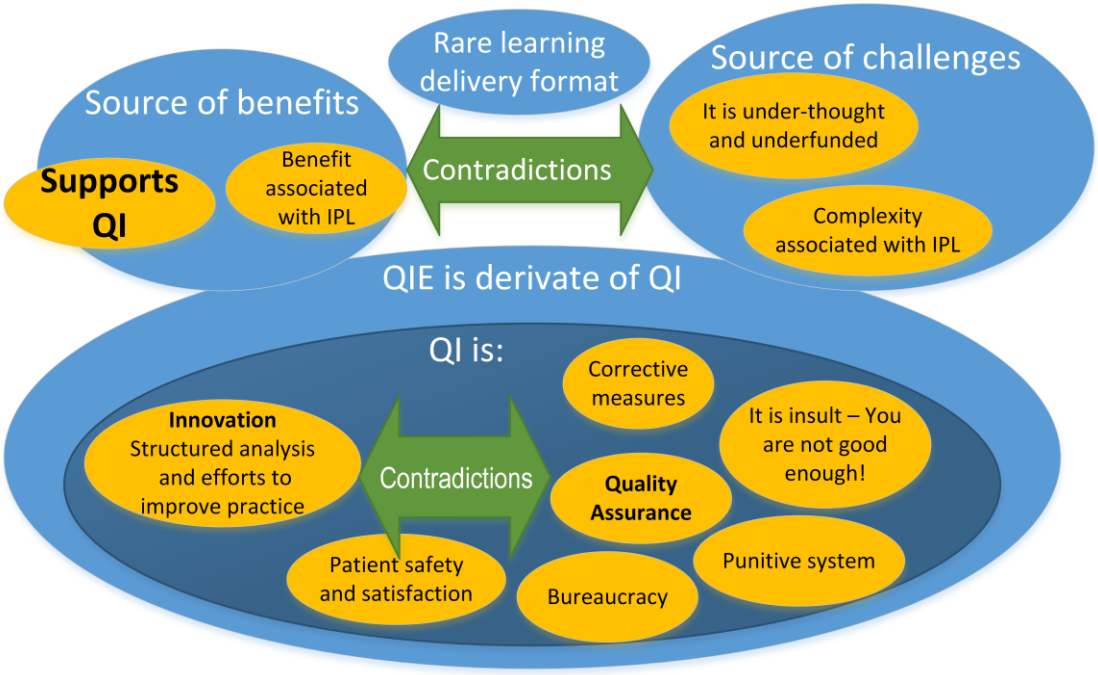


Figure 29. QIE thematic map

Benefits are associated with IPL and improved QI impact.

Challenges are associated with IPL, and change management issues like assuring proper funding and learning formats. As we can expect, there are obvious contradictions between elements of those two themes. For example, if QIE is not properly taught or properly funded, it will not be able to support QI as expected. That is a very straightforward argument.

Derivate of QI. On the other hand, more latent, more common, and therefore potentially more dangerous contradictions reside under "QIE is derivate of QI" theme. The danger of contradictions in that theme is that as latent issues, they can become permanent. For

example, if instead of “QI is structured analysis and efforts to improve practice and innovate,” QI is implemented as a “punitive system” or “corrective measure,” potential for impactful QI and QIE will be significantly reduced. “Punitive system” and “corrective measure” are models focused on fixing errors after they happen, not making improvement.

The latent issues may obfuscate underperforming QI system and, if the underperforming QI system is diagnosed, may make it hard to change that system. The logic is: A form of a QI system is in place. Therefore, the motivation to implement a new system is reduced. Furthermore, an inappropriate QI system may add to the impression that all QI models are problematic. Therefore, instead of being motivated to improve QI practices, and using the existing QI practices as sources of experience, that old “not well-functioning” QI model can enforce the status quo and increase skepticism toward QI practices in general.

Correction of that latent contradiction may be a lengthy project. Significant effort will be needed to convince stakeholders that the new system is better, that it is impactful, and that people will like it more that the old one. That struggle adds to an already major effort needed to implement the new system.

4.3.1 Locations of QIE in activity system

Mapping those perceptions on the activity system map helped me expose that contradiction. As Figure 30 illustrates, QI and QIE have many processes in the production and development triangle. Production is focused on maintaining the system as it is; the goal is to keep the engine running. On the other hand, activities in the development triangle can create improvements.

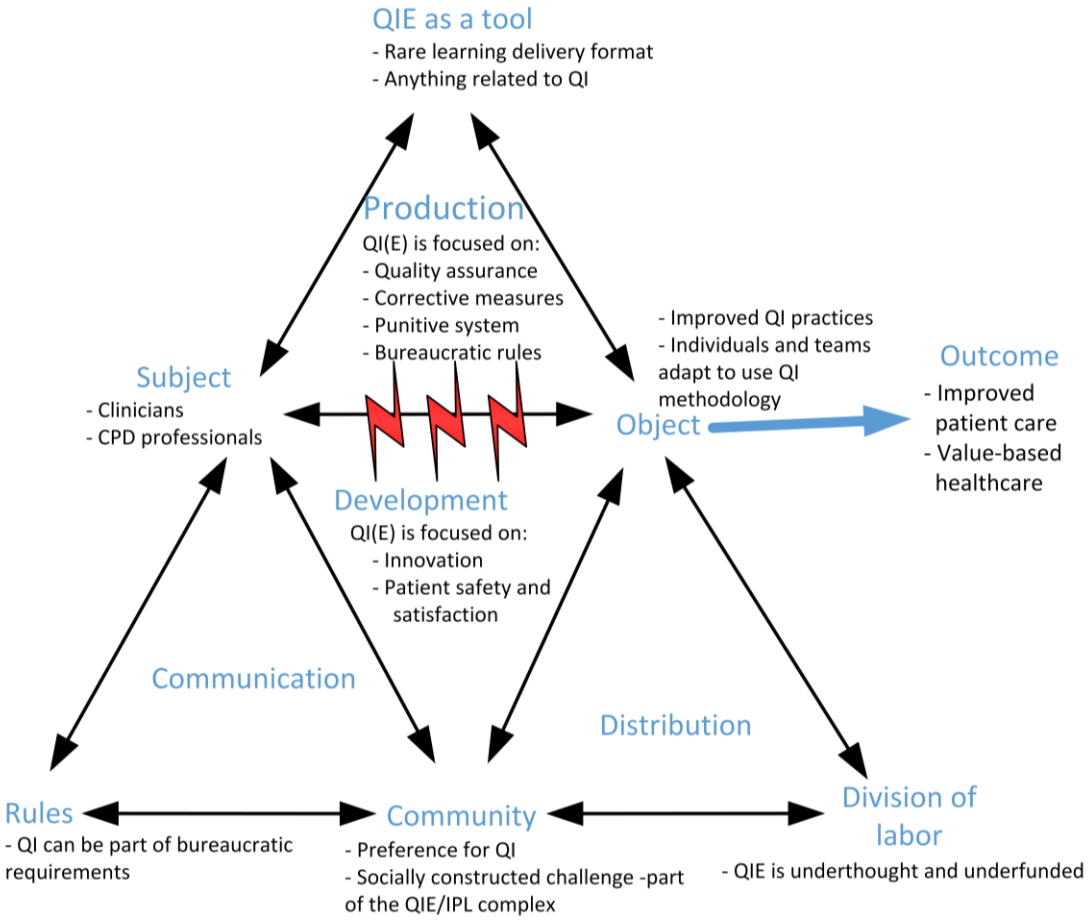


Figure 30. QIE on activity system map
– conflict between QI(E) as production and QI(E) as development.

In the earlier section I used a thematic map and activity system maps to present interactions between themes. In the section that follows, I will present themes in more detail.

4.3.2 QIE as a source of benefits

Theme QIE as a source of benefits presents QIE mainly as a bridge: to QI and to IPL. In more detail:

Supports QI. QIE is recognized as a benefit in a way that it leads to QI and better patient outcomes. Good examples of QIE programs teach learners how to do a QI project and how to analyze QI data. A few participants described QIE benefits solely in terms of QIE, while more often QIE benefits were presented in combination with IPL.

A few comments illustrate QIE as a benefit that will improve services, make them less expensive, and more patient-centric:

> *Benefits would be that you may provide better care, which ultimately leads to better outcomes.*

That perception sees all other factors of the system as they are (uniprofessional learning, similar division of labor, similar tools, etc.). However, since individual practitioners are more knowledgeable about QI, the quality of healthcare services is improved.

Benefit associated with IPL. Another view of QIE as a benefit is that it enables team-based healthcare education focused on QI. Ultimately that bridges to IPL. Therefore, comments about QIE benefits were described in more detail in the following section, where QIE and IPL are discussed together.

Example of a comment that starts as definition of QIE benefit, but bridges with interprofessional collaboration, and latter IPL is:

> *I think [QIE] has great value. If there's a strong connection, if there's crossover that requires that type of training, like the perioperative surgical home, or the nurse that's working with the surgeon, that's working with the anesthesiologist.*

4.3.3 QIE as a set of challenges

Theme QIE as a set of challenges, similar to the previous theme—benefits—in one code presents QIE as an extension of IPL. In another code, ironically, it presents QIE as a neglected project. It looks like QIE supports QI, but it doesn't work other way. There is not much QI when we design QIE.

QIE as underfunded and under-thought project

While QI and QIE are very popular terms, we hear much more encouragement than practical support. For example, significant reimbursements hospitals are receiving are tied to participation in QI projects (McWilliams, 2017). However, investment of time and effort in those projects does not match reimbursements. That aligns well with the positivistic culture that is still dominant in medicine. That culture promotes a qualitative approach—looking for "hard data," while ignoring socially constructed, qualitative aspects of QI. As a result, theory is rarely used, methods are simplified on things that can be easily measured, and the ability to assess and improve complex processes is reduced. Berwick (2007, 2013) explained that mismatch between goals and tools used by explaining that many healthcare QI interventions are like "eating soup with a fork."

Educational formatting and focus of QIE interventions sometimes misses the target: instead of teaching how to do QI in complex healthcare environments, it teaches positivist QI theory. Therefore, QIE trainees often don't have sufficient skills to lead a QI project; they are not confident enough to secure QI project buy-in, find a project sponsor, engage peers in the project, or develop solutions for complex, usually social aspects of the project. Such situations can have a ripple effect. Insufficient familiarity with complexity of QI processes will result with QI projects that, in the short term, have limited impact. In the long run such projects can have

strong negative effects. If, QI enthusiasts don't achieve expected success with QI project, there is a decent chance they will hesitate to do another; there is a big chance that they will not share what they learned from this project. They may even avoid discussing QI issues. That will enhance the possibility that new errors happen (Edmondson, 2004). Ultimately, potential QI leaders and enthusiasts may become QI skeptics.

> *Because I think quality improvement projects should be directly linked—it should be a result of quality improvement education. I think a lot of the times when you do quality improvement projects—at least the ones that I've seen a lot from residents—they're crap. There's not alot of money given to residents to kind of develop quality improvement projects. That's part of their residency training, is that they have to develop quality improvement projects. A lot of their money is tied to developing quality improvement projects. But I think because there's not a lot of money allocated to it, the programs themselves or the projects they come up with are kind of ho-hum.*

QIE as a socially constructed challenge that is part of the QIE/IPL complex

A significant number of QIE challenges are related to socially constructed interprofessional collaboration. Therefore, a significant number of comments describing QIE challenges included challenges related to IPL. For example:

> *Quality improvement is something that everybody knows is very important, but I think that we still have a little bit of a way to go to: 1) design curriculums that are for the professional educations that are combined, and 2) also the cultural changes that are required for learners, for physicians, nurses, and any other profession, to sit down and learn together.*

4.3.4 QIE as derivate of QI and other related concepts

Quality Improvement Education is closely related to quality improvement. Participants were very often describing QIE through lens of quality improvement or—more directly—as quality improvement. Through that lens, QIE is QI associated with some amount of education. Therefore, an important element of understanding their perception of QIE is understanding how QI is perceived. During the interviews, I discovered that there is no consensus on what QI is, and strong contradictions can exist between perceptions. The main contradiction is between quality improvement as a process that leads to improvement, and quality assurance as a process designed to stabilize status quo (and can, therefore, *block innovation and improvement*). Various participants perceive QI as one or more elements from the list below.

QI is:

1. Structured innovation/improvement-focused process
2. Patient safety and satisfaction
3. Quality assurance
4. Insult—you are not good enough
5. Corrective measures
6. Punitive system
7. Bureaucracy

QI is a structured innovation/improvement-focused process

Through this lens, QI is perceived as an analytical, innovation-focused approach, where practitioners, usually as interprofessional teams networked with patients and other stakeholders, are the main source of innovation. Some interviewees think that is how it is and how it should be. For example, one participant noted:

> *I think innovation is a requirement; it is a prerequisite [for QI] at this point.*

A few participants believe that QI should be improvement- and innovation-focused. However, they are not convinced that it is common practice. Bureaucracy, lack of QI skills, lack of teamwork and many other factors, can easily convert something that is designed as an innovation-focused QI project into a failed attempt. This converts QI into something we want to avoid in the future. Consequently, well-designed, improvement-focused QI projects are still perceived by many as *grand ideas*—unrealistic hopes.

> *But to get from developing a policy based upon research, to implementing it in a clinical practice, and then monitoring the quality of that, and then evaluating the effectiveness is so primitive and in development…essentially, it's a 'grand idea' right now in most departments.*

QI is quality assurance

The QI as Quality Assurance perspective assumes quality is a set of externally defined criteria practitioners must comply with. Observed through that lens, QI is not an innovative process, but a method to assure that minimal quality requirements are met. Therefore, quality assurance may shift focus from improvement and innovation toward maintaining of the status quo. Many participants view quality assurance as the main player:

> *I believe the common thread [in QI] is to achieve the standard, and I truly believe that people will perform to the level that you expect of them.*

QI is insult—you are not good enough

A few CPD professionals and one clinician express concern that the need for QI and QIE might be perceived as a message: "You are not good enough, and I'm questioning your professional prerogative." That seems to be the issue that is affecting more senior healthcare professionals who historically do not have experience with QI, have established practices, trust in their professional prerogative (Berwick, 2016), and are not very open to change. Younger healthcare providers have gone through some kind of QI training. Consequently, they are much more open to QI and QIE.

> *I think quality improvement is a very difficult pill for people to swallow, because it basically says that I'm not doing something to optimal levels. When everybody says: "I have the ability… I had so many years of training and so many years of education, and they've been in practice for 15-20 years." And to go to them and say, "Okay, now you need to improve."*

Based on this comment, this can be interpreted as a generational issue. However, it seems that the roots are much deeper. "*An epic collision of 2 eras with incompatible beliefs*" (Berwick, 2016, p. 1329) is shaping U.S. healthcare. Beliefs built around professional prerogative, trust, and self-regulation of medical professions clash with beliefs of accountability to external, market-driven forces. In other words, healthcare professionals who believe that they should self-regulate are exposed to various external forces like financial rewards and punishments based on QI practices. Clash between romance of professional prerogative, and tools that enforce external accountability, creates mistrust, anger, and encourages self-protective reactions. Furthermore, shaped by the still-dominant positivistic worldview, accountability is very often built through reductionism (R. Allen, 1991; Berwick, 2016; Porter & Lee, 2013a). It tracks simple quantifiable concepts—that are usually not the best match for complexity of healthcare, and utilizes extrinsic motivators—that may crush intrinsic motivation and professionalism (Wynia, 2009). Therefore, limitations of accountability models in use add fuel to the fire. Ultimately, that conflict sucks huge amounts of resources and energy we would otherwise be able to use to improve care.

QI as corrective measure

QI is sometimes perceived as a corrective measure. Observed through that lens, QI is a process that is initiated by an error. Following that error, the QI department will organize a series of steps in attempt to assure that the same error does not happen again.

> *Well, all the hospitals have QI people and departments. When there are problems or issues that are brought to them, then they begin to investigate. But they are brought to them by the exceptions or the difficulties that happened, they are not brought to them by a routine process.*

While this approach may prevent repeating errors, it is not focused on systematic improvement. Those QI interventions are perceived more as error fixing than a quality improving process. One surgeon explained it:

> *Mostly it's the errors that catch their attention and then they go back and try and fix as opposed to being preventive or process-controlled.*

QI as punitive system

QI can be viewed as a system designed to track and discipline underperformers. In the short term that approach might achieve results. Reputation, peer (dis)approval, fear of liability, and shame are strong motivators for healthcare professionals (Ubbink, Visser, Gouma, & Goslings, 2012). However, in the long run it builds animosity and mistrust toward quality improvement (Leape, 2002) and can destroy trust and teamwork. Due to animosity toward the QI system, errors may not be reported, therefore it my look like errors are not happening.

One nurse anesthetist described it:

> *I think that in my practice over 30 years that the quality improvement systems I have seen have been a way to document complications and put them in a database and discipline people who are higher-risk providers. And it's not going to be used for improvement. It's been used as a method to test people who screw up… But a lot of times because it's been a punitive system, errors do not get reported enough. It is not utilized enough, so much that… there is not really any difference between physicians or nurses in most departments—because it's not done enough.*

QI as bureaucracy

Quite often QI is perceived as a complex process practitioners are required/strongly encouraged to do by regulations (Clough & McClellan, 2016; Tempero, 2017), and it involves lots of paperwork. Therefore, although it is never central theme of their comment, bureaucracy is sometimes alluded to as a part of the QI process.

4.3.5 In sum

QIE is an emerging phenomenon. Perceptions of it are shaped by related phenomena like QI and IPL. QIE is often perceived as an extension or variation of QI. QI is well known, respected, and a popular/influential phenomenon. Therefore, various perceptions of QI strongly shape perceptions of QIE. An important divide is between perceptions of QI as an improvement-focused process, and perceptions of QI as status quo assurance or an error correction process. Influence of IPL on perception of QIE will be discussed in more detail in the following section.

4.4 PHENOMENON 3: IPL AND QIE INTERACTIONS

The first research question asks: *How are QIE and IPL and their interaction perceived by four groups involved in perioperative teams and their CPD providers?* Understanding the system created by interaction between QIE and IPL is an important building block of that answer.

Complex interactions. The analysis showed significant variability in how interactions of QIE and IPL are perceived. QIE and IPL are complex phenomena located in a complex system. Therefore, describing the relationship between them, and the potential system created through that relationship, could be a delicate task. Complexity theory teaches that the system is more than an agglomeration of parts, and the system can have significantly different features than parts (Bleakley & Cleland, 2015). Furthermore, as an open, dynamic system, QIE/IPL is changing in reaction to drivers from the context. Therefore, in this analysis I have two goals. I will describe 1) models of how interactions are perceived and 2) what are the main mechanisms behind interactions. Analysis will show that one mechanism can cause more than one model of interactions, and more mechanisms can be involved in shaping one model.

Mapping interactions. The majority of perceptions describe QIE and IPL as two phenomena that are overlapping or are logically connected. There are also a few comments describing them as quite independent entities. The question is: what is the nature of their connections; how much are they overlapping; which one is more dominant; is there a parent one; and how distant are they?

I will use diagrams to map the nature of the models created by combination of QIE and IPL. The first image will show all diagrams together. The goal is to illustrate the variety of models created. Later, those models will be categorized based on the mechanisms behind them, and described in more detail. As Figure 31 illustrates, QIE and IPL interact in numerous ways to create a QIE/IPL system. That confirms that QIE/IPL as phenomenon exist. However, there is no consensus on how that phenomenon looks.

The perceptions are roughly ordered from perceptions with most similarities and overlap to perceptions where QIE and IPL are perceived as very distinct entities:

- Model 1: IPL and QIE are parts of the same phenomenon—QIE/IPL
- Model 2: IPL and QIE are very related, in significant amount overlapping phenomena
- Model 3: IPL and QIE are related phenomena that overlap in smaller amount
- Model 4: IPL creates context in which QIE is part
- Model 5: QIE and QI act as inseparable entity QI(E). IPL acts as a subsystem of QI(E)
- Model 6: IPL is interprofessional way to deliver QIE (subsystem of QIE)
- Model 7: QIE is created in interaction between QI and IPL
- Model 8: IPL is foundation for QIE, which is foundation for QI
- Model 9: IPL and QIE are entities connected with the same contexts or same goals
- Model 10: QIE and IPL are separate entities, and it is better not to mix them

Thematic map of models illustrating interaction between QIE and IPL:

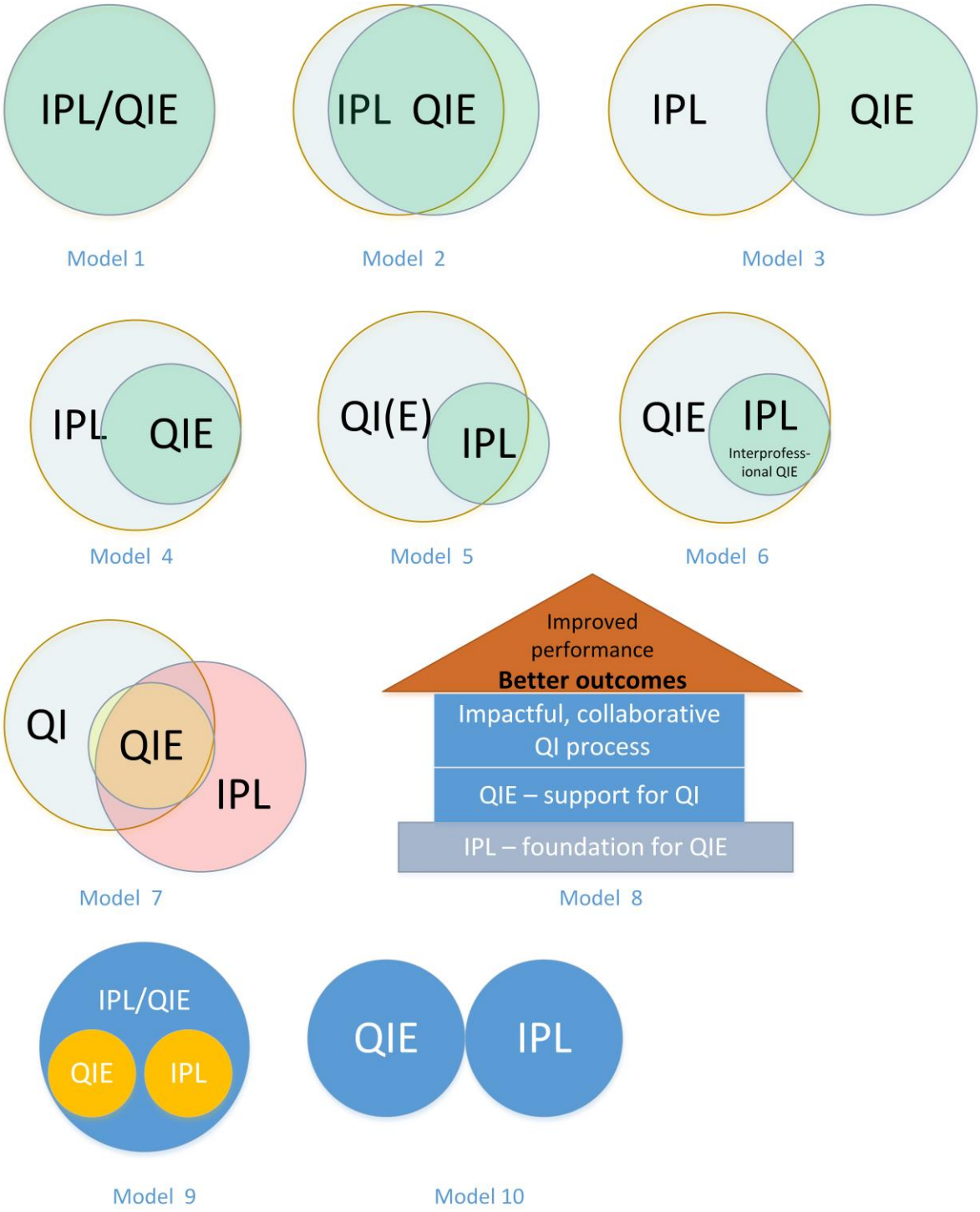


Figure 31. QIE/IPL thematic map.

The 10 mapped models illustrate the significant variety of perceptions of how QIE and IPL interact.

Categorization. Interviews described five different types of mechanisms that shape those systems:

1. QIE and IPL are similar or overlapping phenomena.
2. Logical, causal connections bond QIE and IPL.
3. Contextual interactions connect QIE and IPL.
4. QIE-IPL relationship has been evolving through history.
5. Strong difference between QIE and IPL exist.

In the text that follows, QIE/IPL variations are grouped based on the mechanism behind them.

4.4.1 QIE and IPL are similar or overlapping phenomena

Similarities between QIE and IPL theme perceives QIE and IPL as two very related, similar or identical phenomena.

Very similar or identical. A significant number of participants—with representatives from all four groups of clinicians—describe QIE and IPL as identical or very similar entities. For example:

> *I can't identify any differences, actually. Because I think that it would be a complete improvement if you had interprofessional education.*

> *Quality improvement equals interprofessional education in many cases… by working more closely together, we're improving the quality of care.*

> *I think they're very similar.*

The described interaction is located between these two models:

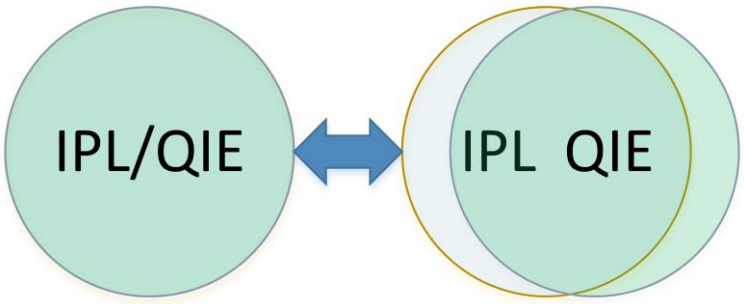


Figure 32. QIE and IPL, from identical to very similar.

Significant overlap. Many others described it as different phenomena that overlap in many areas. From a big picture view, they look quite similar. However, if we analyze details we may recognize two different phenomena. For example:

> *They cross over. They're related… Quality improvement might require also education within this same context of multiple professions, but requires understanding of methodology.*

> *The difference is the semantics, the specifics of what you're talking about. Quality improvement education wouldn't necessarily have to be interdisciplinary and interdisciplinary education would not have to necessarily be quality improvement.*

The described interaction is located between these two models:

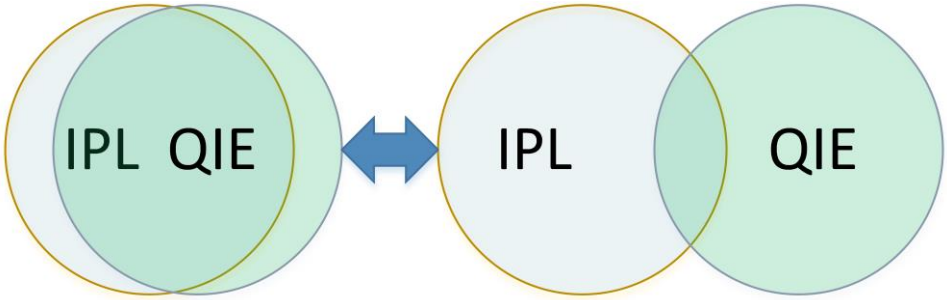


Figure 33. QIE and IPL, from significant to moderate overlap.

It is interesting that one interviewee suggested that QI(E) is part of IPL—while another interviewee said that QI(E) cannot be "*subsumed in any way by interprofessional education*." As the quotations below illustrates, in both cases perceptions QIE and QI were merged. The interview question stated QIE, yet the term used in answer was QI.

> *I just think you can't have one without the other maybe. Maybe quality improvement is kind of a part of interprofessional learning.*

> *Quality improvement is such a broad topic that it's not subsumed in any way by interprofessional education.*

Such interchangeable use of QI and QIE is a potential cause of confusion. Figure 34 illustrates possible explanation of this contradiction. QI is a big topic, and QIE as learning activities that support QI is part of that topic. At the same time, QIE, as learning that empowers teams to deliver measurable improvement, should be interprofessional. In other words, while QI can't be subsumed in IPL, and IPL can't be subsumed to QI, in the area where they overlap, they create QIE.

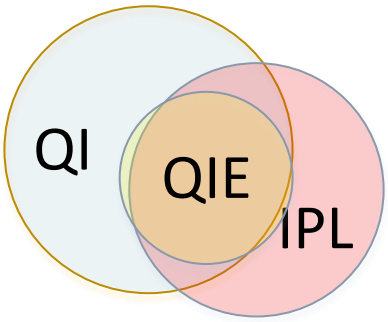


Figure 34. QI, QIE and IPL interactions Model 7: QIE is created in interaction between QI and IPL.

4.4.2 Logical, causal connection between QIE and IPL

Another group of perceptions describe QIE and IPL as separate phenomena that are logically very connected. For example, although IPL and QIE are different entities, one can't happen without the other.

For example:

They're different from each other, yet they're interconnected, because you cannot have one without the other.

A few mechanisms participants used to explain relationship between IPL and QIE:

- IPL bridges silos and creates cultural context where successful QIE can happen.
- IPL is a scientifically proven best practice to achieve QI and deliver impactful, quality-improving learning in a complex healthcare system.
- QI(E) creates context where IPL is essential

IPL bridges silos and creates cultural context where successful QIE can happen.

Participants provided numerous reasons why they think QIE and IPL are connected. One reason is that IPL bridges silos and connects people into successful learning teams. In other words, IPL creates context for QIE (Figure 35). Without good interprofessional collaboration and learning, each profession will stay locked in their own professional silo. Since that silo will limit their ability to see out of the silo, they will spend significant time and resources to protect the interests of that silo, instead of investing the same time and resources in system-wide, QIE-enhanced quality improvement initiatives.

There's a lot of overlap on a large scale. When multiple professions come together, the quality issues are then raised and become important. When the professions stay by themselves and independent, I don't think they focus on those quality issues. I think they're very egocentric. I would correlate that more interprofessional education is going to lead to more quality education.

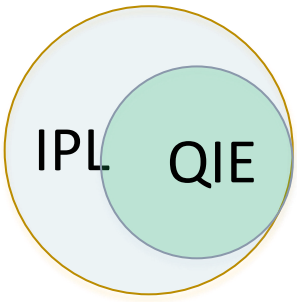


Figure 35. IPL as a tool that creates context for successful QIE.

IPL is a scientifically proven best practice to achieve QI and deliver impactful, quality-improving learning in complex healthcare systems.

A few participants echoed the scientific evidence of the importance of communication, collaboration, and teamwork on quality and patient safety (Leonard, Graham, & Bonacum, 2004). Based on that evidence, they concluded that interprofessional training is the best way to achieve sustainable quality improvement. They did not see it as the only way, but the best way. For example:

> *"If it is clear from our best evidence that quality improvement, and in general quality and safety, rely on teamwork, interprofessional collaboration, and communication, then one can only deduce that the best way to achieve quality improvement would be by interprofessional training.*

In many ways participants mentioned the complex, multi-professional format of healthcare delivery as a challenge, and IPL as a learning format that can address the challenge. Simple—usually uniprofessional—and didactic formats are described as poor matches for that complexity. The anesthesiologist from Europe explained it:

> *This is the best way to learn. Why? Because the work that we do is connected on several levels and it is most definitely teamwork. It is important to know what the others are doing… to be able to adequately do yours.*

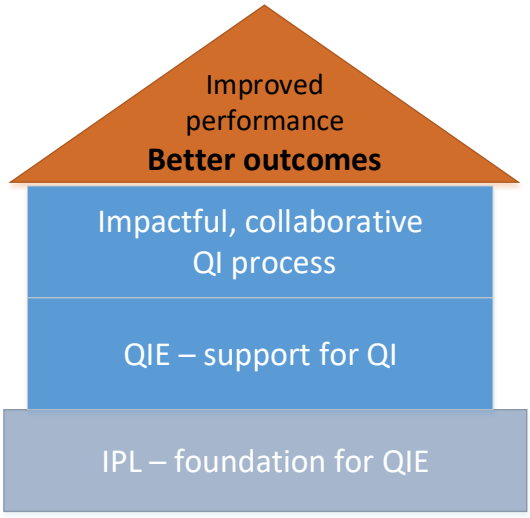


Figure 36. IPL as best practice to support QI(E)

These comments describe IPL as a foundation for successful QIE, QI, and ultimately improved performance and better outcomes (Figure 36).

QI(E) creates context where IPL is essential.

One very practical view perceives QI as a task of importance for all workers; it is everyone's business. Therefore, while profession-specific education can be very didactic and focused only on content of interest to one profession, education focused on quality improvement is of interest to everybody. QIE creates context where IPL is needed (Figure 37). To be successful, QIE cannot be just a didactic presentation of, for example, a new QI protocol, but should be a collaborative, interactive learning activity preparing teams to make measurable changes in their daily practice. Therefore, it should be interprofessional. One anesthesia professional explained:

> *…the thing that we have in common is the quality improvement. So, the specific professional education's very different between surgeons and anesthesia, but when it comes to quality improvement, there's enough overlap that we can do all that together, and benefit from learning together.*

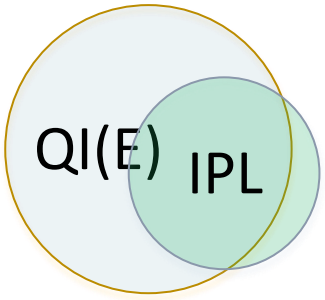


Figure 37. QI(E) as something that almost always interprofessional, and therefore involves IPL.

4.4.3 Contextual interactions

The previous section described interaction between QIE and IPL based on their intrinsic characteristics. This section focuses on indirect interactions—through context. QIE and IPL are very often found in the same context, and that context makes them look similar, connected. This raises the question of cause: are QIE and IPL in the same context because of similar and complementing characteristics, or does being in the same context motivate them to act synergistically?

The contextual interactions mentioned in the interviews are:

1. QIE and IPL have similar goals.
2. QIE and IPL are bundled through Crew Resource Management (CRM), Perioperative Surgical Home (PSH), and Enhanced Recovery After Surgery (ERAS).

QIE and IPL have the same or similar goals. This is a view echoed by many participants (Figure 38). One description was: "*the goal of interprofessional learning is to have quality improvement*." In some cases, patient experience, healthcare cost, and health outcomes were described as shared goals. In other cases, their purpose was described as something that is identical, "*the same*."

For example:

> *I think [QIE and IPL] have the same purpose. I think interprofessional cooperation and quality are like hand and glove. No one group or individual can affect any significant change in quality improvement without all the other members of the team participating.*

Figure 38. QIE and IPL—two phenomena with the same goal.

In other cases, their purposes were described as similar, but with slight differences. For example:

> *I would say similar purpose with different focus.*

If QIE and IPL have the same goal—support for quality improvement—then we can assume that IPL is QIE delivered in an interprofessional manner, while QIE may be interprofessional or not. In other words, we can talk about interprofessional QIE and QIE that encompasses all learning formats focused on QI (Figure 39).

Figure 39. IPL as interprofessional part of QIE.

Contextual similarities—QIE and IPL are bundled through CRM, PSH, and ERAS.

Various emerging concepts focused on QI and patient safety are created around concepts that integrate QIE and IPL (Figure 40). For example, PSH and a related concept, ERAS, create official context where QIE and IPL happen simultaneously. While in a traditional or non-managed environment QIE and IPL may or may not happen simultaneously, organizations that utilize ERAS or PSH use QIE and IPL simultaneously. Therefore, participants with experience in PSH and/or ERAS perceive IPL and QIE as well-connected elements of the same system. One participant explained:

> *It's a direct tie. The perioperative surgical home is the epitome of improving quality issues and utilizing interprofessional capabilities. It's taking all of them together and putting them in one system.*

The anesthesiologist from Europe described IPL and QIE as something that is inherently connected through CRM. During the past few years the model is gaining popularity in Europe. CRM in his hospital is usually delivered as a program that includes introductory training, simulation-enhanced team-based activity, reflection, and a performance improvement plan. He explained:

Figure 40. PSH, ERAS, and CRM as concepts that utilize and merge QIE and IPL.

> *We talk more about crew resource management than quality improvement training, but in principle I think those two are the same. We are talking about improving the quality of what you do by joint practice and coordination of opinions of all groups involved in the process.*

4.4.4 QIE-IPL relationship has been evolving through history

Theme QIE-IPL relationship was evolving through history describes QIE and IPL as something that was separated due to errors or various historical and contextual reasons. As time passes and the historical drives become less influential, QIE and IPL are becoming more integrated (Figure 41). Many participants argue that we should take a more active approach and enhance integration of QIE and IPL.

IPL and QIE as something that was historically separated, but not anymore.

The European anesthesiologist described QIE and IPL as something that *was* separate—but not anymore. He explained that IPL/QIE are established learning formats in the Netherlands, and they helped improve patient care in comparison with how it was 10-15 years ago.

> *These two things used to be separated—anesthesiologists had their own education, the nurses had theirs, surgeons their own. This [interprofessional] way we are trying to coordinate the work of all of them. This has a large impact on the quality of treating a patient now when compared to 10 or 15 years ago.*

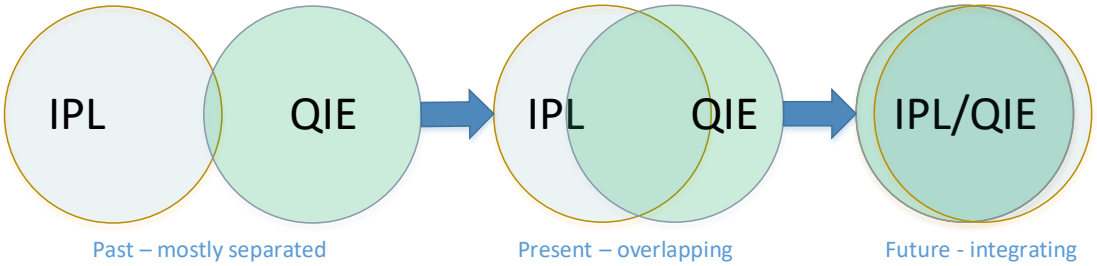


Figure 41. Transformation of interactions between QIE and IPL through time.

IPL and QIE are separated due to error

Other participants described IPL and QIE differences as the consequence of contextual/human error. In the ideal world, they should be well-connected. Therefore, they perceive separation between QIE and IPL as an issue we created, and a task we should address. For example:

> *They're completely separate, and they shouldn't be.*

> *I think the benefits with quality improvement are very much aligned to the team-based. …So, it always confuses me how you promote team-based care, but you don't promote team-based education. They go hand-in-hand.*

4.4.5 Difference between QIE and IPL

The previous sections presented various perceptions of similarities between QIE and IPL, starting from the most similar to the least similar. However, a two participants observed QIE and IPL as something that shouldn't be combined (Figure 42).

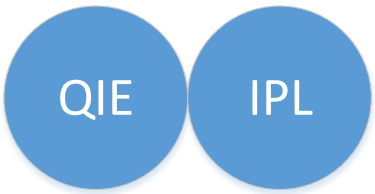


Figure 42. QIE and IPL as two independent, better-not-to-mix, phenomena.

> *I think [for QIE purposes] it's more appropriate to focus on single professions. The reason being is that you can talk about quality improvement in cardiology, but as a plastic surgeon that doesn't mean anything for you. It doesn't apply to my practice.*

Those perceptions were associated with formal, didactic, content-focused education. QIE observed through that lens should be focused on delivering content expertise specific to each profession. That is significantly different than interprofessional learning, where "*more professions learn with, from, and about each other to improve collaboration and the quality of care*" (Hugh Barr, 2002). However, that perception paints QIE as something that is similar to traditional education. Therefore, I'm prone to interpret this thought as belief that traditional, content-focused education and IPL aren't very similar. While that is true, QIE is not part of that picture.

In summary. This section provided various views on complex interactions between QIE and IPL. Almost all participants believe they interact in various ways that creates a QIE/IPL system. That scale ranges from "it is the same thing" to "there is small overlap". There is no consensus on how they are related, and what is their interaction. Furthermore, one perspective describes QIE as traditional uniprofessional content-focused education and concludes that QIE in that format is not compatible with IPL.

I will conclude the section with a comment that illustrates the complexity of that interaction, and numerous ways that interaction can manifest.

> *While they're not exactly the same, I think that they're interrelated, and teaching and training in one enhances teaching and training in the other, and vice versa. Answering your question, no they're not different. They're not exactly the same, but they complement one another very much.*

4.5 Phenomenon 4: Technology-Enhanced Learning in Perioperative Context

In this section, I will address the question: How do perioperative professionals experience the TEL tools that are used or may be used to support QIE and IPL?

Perception of TEL in perioperative context is shaped by two visible contradictions and set of latent contradictions.

First contradiction is between TEL as a tool needed to address emerging challenges and set of challenges related to TEL implementation.

Second contradiction is between TEL as technology and the mindset to enable communication, networking, and innovation, and TEL as using technology to maintain the status quo of siloed, content-focused learning. Since QIE and IPL are important parts of emerging challenges, and they are challenging the status quo, those contradictions are closely related to QIE/IPL.

Finally, the last four themes I created in this analysis can be loosely grouped as, "Theory and improvement." They include perceptions of TEL as something that should be well-supported by theory, and three concepts that are exposing contradictions and suggesting the need for a more rigorous theoretical approach. Those are: (lack of) reflective learning, learning as arms race, and simulations (in a silo).

Themes. Categorized through those two contradictions and one group, we have nine themes:

Contradiction 1: addressing and causing challenges

1) Needed tool to address the emerging challenges
2) Set of internal challenges

Contradiction 2: connecting and supporting siloes

3) Enabled communication between learners, and between learners and resources and learners and faculty
4) Networked learning
5) Enhanced didactic, content-focused education

Theory and improvement

6) Something that needs to be backed up by theory
7) Simulations (with siloed practice improvement)
8) Reflective learning (lack of)
9) Learning as arms race

Figure 43 represents the thematic map, and the description of themes is below.

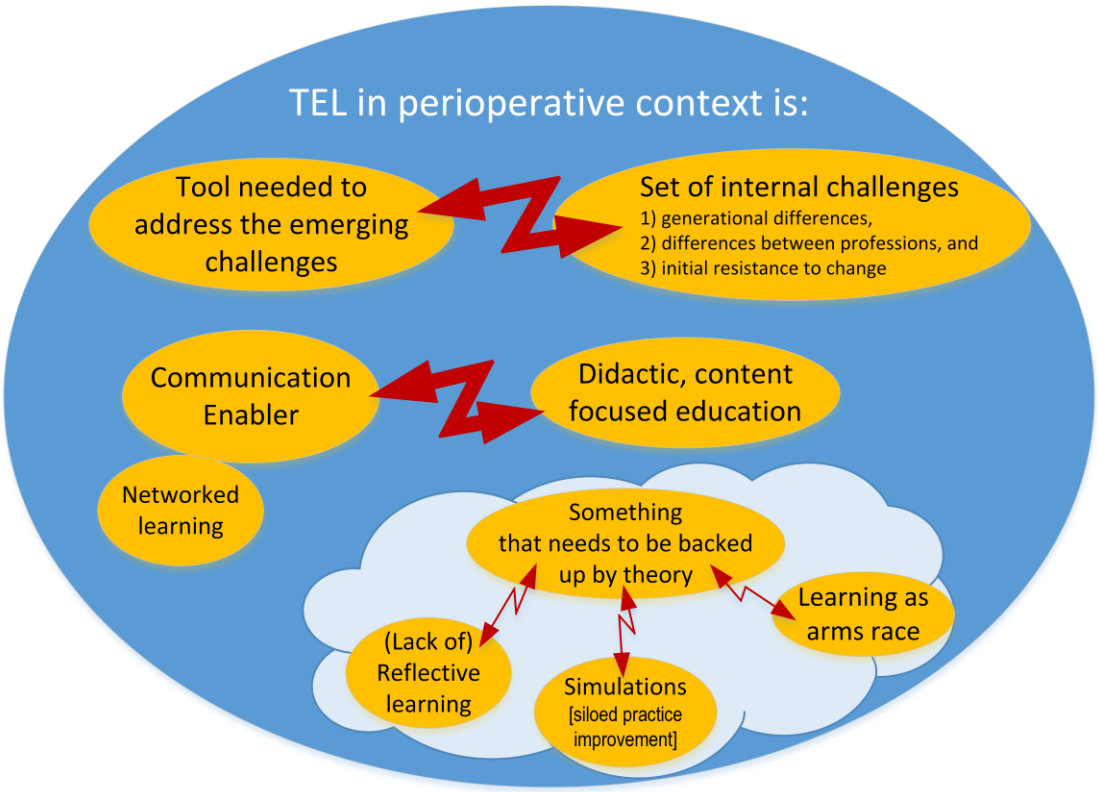


Figure 43. TEL thematic map.

Shy to talk. The first interesting finding was that some participants were shy to talk about TEL—although they have strong opinions. In those cases, I had to use additional questions to "break the ice." After that, the interviewees proved to be very opinionated about benefits and challenges of available TEL. Participants explained that initial resistance to talk was because:

- Healthcare professionals are a) very busy and well-educated professionals who do not have time to spend on new electronic gadgets (Clemmer, 2004), and b) they are aware that in comparison with healthcare, their knowledge of TEL is relatively limited. Therefore, as one interviewee explained: "*People in medicine are very, very slow to accept a technological approach to education as compared to some other disciplines*."
- That said, healthcare professionals are continuous learners who increasingly use TEL. They are aware that TEL is an important part in the mosaic of their learning and professional success.

This contradiction in how interviewees described TEL suggests that if it is well-planned, well-supported, and properly promoted, technology-enhanced QIE and IPL will have a significant role. However, even small missteps in implementation can cause significant resistance. That aligns with findings from the literature review: the 2015 revolt against maintenance of board certification was to a significant extent caused by the way TEL was (mis)used (Kempen, 2012; Strasburger, 2011). Interestingly, the first big response to the revolt was suspension of Quality/Performance Improvement CME programs for internists (Baron, 2015).

Participants described a few successful TEL examples. Team-based high-fidelity simulations and the PSH learning collaborative (Ferrari et al., 2018) are probably the most well-known success stories. However, there are serious concerns about how TEL is implemented, and how it will affect people. For example, clinicians can resist the change until it becomes obvious that the change is beneficial. Different generations and different professions can have a different affinity for technology. Nurses were described as a profession that likes collaborative TEL. Medicine, on the other hand, seems to be averse to collaborative TEL. Contextual factors like political conflicts, competition between professions, and a lack of legislation that protects learners' privacy in the U.S. play a significant role.

4.5.1 Contradiction 1: TEL is addressing and causing challenges

Contradiction 1 is built around perception of TEL as a tool to address the emerging challenges and as a source of challenges.

TEL is a tool needed to address emerging challenges. Most participants described technology in a positive manner as a tool needed to address the emerging challenges. Some of them explicitly stated the need to increase usage of TEL. For example:

> *It's an evolving time. …I feel like it would be sad if some people did not use the technology that we have available to us today.*

TEL is a source of challenges. Challenges related to TEL got even more attention. Anesthesiologist assistants and nurse anesthetists were the main source of comments. The challenges are: 1) generational differences, 2) differences between professions, and 3) resistance to change.

1. **Generational differences** are described as a challenge where older generations are less willing to participate in TEL. That challenge, based on the interviewees, is affecting primarily physicians and nurses.

> *Some of the older generation, nurses that have been there for over 30 years, it's a disadvantage for them to have technology-based learning, because they don't know how things work as well.*

Generational challenge wasn't an issue described with anesthesiologist assistants. They seem to be the most agile in this context. Some reasons for that:

- Since they are the youngest profession (first anesthesiologist assistants graduated in 1971) that recently expand—a significant share of the workforce is younger.
- As "assistants," they are, more than others, expected to be agile. During the interviews, anesthesiologist assistants embraced the "assistants,' or what they like to call it: "mid-level provider" role.

- Since graduate programs for anesthesiologist assistants last usually two years it is possible to customize them, and quickly deliver anesthesiologist assistants attuned to emerging system changes like PSH. One anesthesiologist assistant explained it: "*Think we're going to have to see a mid-level provider change the way we educate for the perioperative surgical home.*"
- Finally, while the other three professions are usually perceived as a terminal role, anesthesiologist assistants are described as "*a career ladder in which medical school and a medical specialty would be a natural option for advanced standing.*" (Gravenstein & Steinhaus, 2003, p. 6)

2. **Differences between professions** play another significant factor. For example, a few interviewees explained that physicians are less willing to participate in collaborative online activities:

> *There're different levels of receptivity to e-learning among the different disciplines.*
>
> *…Our observations were that the nursing students were the most active, the most interactive and the most open in our interprofessional classes and the medical students and fellows were the worst. Then the other professions, the public health and the engineers and the arts and sciences, were somewhere in the middle.*

Nurses and anesthesiologist assistants show noticeably more interest in TEL, especially collaborative, team-based TEL. The amount of available time, professional epistemologies, and the hierarchy of positions contribute to differences between professions.

Epistemology. Medicine is, many authors argue, still rooted in a positivist illness-cure epistemology that is not very involved in the complexities of human interactions (Malterud, 1995; van Baalen & Boon, 2015), while nurses take a more humanistic approach built around complexities of the caregiver-patient-community relationship (Playle, 1995). That worldview makes nurses more ready to jump into complexities of collaborative online education.

Lack of time and more power. As described in the Literature Review, U.S. surgeons and anesthesiologists complete their education in their early 30s with a huge (often $200,000-plus) student debt. Therefore, they must be very protective of their time. That aligns well with the fact that their stronger position in the healthcare hierarchy gives them more power to select or reject collaborative learning.

Finally, a culture of blame, intolerance of error, and fear of malpractice claims affects physicals more than any other healthcare profession (Hoffman, Kanzaria, & Johnson, 2014).

Privacy protection. Those factors combined with a lack of clearly defined right to privacy, confidence, and reputation in U.S. law (Louis B. Swartz, Michele T. Cole, & David A. Lovejoy,

2010) can create strong reasons for a very cautious approach toward online collaborative learning.

3. **Initial resistance to change—before technology proves to be helpful** seems to reflect contradictions inherent in healthcare professions—especially physicians. I touched on that issue in the introduction (p:142)—where I described how some participants were shy to talk about TEL.

   On one hand, the fact that clinicians are avid, lifelong learners with six (anesthesiologist assistants and nurse anesthetists) and very often 12-plus years (surgeons, anesthesiologists) of extremely intensive and competitive higher education, suggest that they are very ready to accept improvements. On the other hand, they are very busy professionals working with human lives, and that forces them to be very cautious with adoption of new concepts. That contradiction can be noticed in this comment:

   > *…once team members get past apprehension about down-scaling new technologies into their work processes, then I don't think there's any question that technology does enhance team performance*

4.5.2 Contradiction 2: connecting and supporting siloes

Contradiction 2 is built around perceptions of TEL as a tool that is enhancing communication and networking between previously separated siloes; and as a tool that can be used to enhance the traditional siloed structures. In both cases, TEL is a tool. Therefore, it is up to us to decide which results we want, and then use TEL to achieve those results.

TEL as communication enabler. TEL as enabler of multidirectional communication was the most dominant theme of this phenomenon. Participants in many ways described how TEL can enhance communication between learners, and between learners and resources, and between learners and faculty. In addition to that, TEL is seen as a tool that will empower individuals and teams to customize learning to match their needs, learn on their own time, and, when needed, contact peers or faculty.

> *You can boil it down to, certainly, communication. The ability for instantaneous communication between the interdisciplinary providers… the ability to access learning resources for the team—is fantastic.*

In addition of enabling communication, technology is perceived as an analytical tool that will help us better understand the system, and as a networking tool that will help connect people.

> *Technology is a huge facilitator of this, obviously. It allows us to exchange information more quickly. It allows us to have a deeper understanding of a bigger picture.*

TEL as networked learning. Networked learning is a theme closely related to the theme Communication enabler. As a framework that connects theoretical knowledge with our daily

activities, that builds links between individuals, teams and community, networked learning may be understood as technology enhanced experiential learning in a connected world (Campbell, 2016). That may explain why the underlying belief that technology and connections should be used to connect learning and their daily practice was noticeable. Interviewees describe strong potential of networked learning practices in the perioperative context. Since successful networked learning projects are at this moment isolated examples, strategic collaborative efforts are needed to make networked learning mainstream.

Participants were aware of many cultural, legal, and change management issues associated with networked learning. Contradictions among those variables contributed to creation of various perspectives, starting from noticeable enthusiasm about networked learning to worrisome comments about significant barriers affecting networked learning.

Some learners were very familiar with networked learning principles and how it may support the coordinated (networked) healthcare delivery. For example, one participant energetically stated:

> *"Networked learning is key! Networked learning and coordinating different teams is key in improving patient care."*

Another few participants were enthusiastic about the potential to use technology to connect clinicians. For example, three participants mentioned use of a protected social area where they can build community of practice and discuss challenges from their daily practice:

> *Say, if on our ASA website, that we have a chat forum where members of the society can join and discuss with each other, "Oh, I had this de-identified patient case with such-and-such. What do you all think about that?"*

Two examples of successful networked learning enhanced programs were described. Those are the *Perioperative Surgical Home Collaborative* and a Healthcare Systems Engineering & Patient Safety course. The PSH Collaborative is run by the ASA, while the Healthcare Systems Engineering course is led by surgeons. Both examples were initiated out of the traditional CME/CPD framework, and originally participants were not able to get CME credits. The PSH Collaborative is focused on guiding teams to implement PSH, while the Healthcare Systems Engineering course introduces participants to a master-level course.

PSH Learning Collaborative is created as a community of practice that combines face-to-face, video conference, and asynchronous communication among teams involved in implementation of the PSH concept in their local context. The model is described as an innovative concept that may serve as a template for future courses.

> *I think the [PSH] Learning Collaborative is incredibly innovative. Institutions that consider themselves to be competitors with one another, come to the same place and discuss openly and freely, so that everybody benefits. That's*

> *disruptive innovation to have everybody come together and learn from each other…*

> *Because I think each valued perspective would provide some needed viewpoints into how those QI methodologies fit into their particular practice, which then, if you throw all that into a pot, starts to then coordinate together… So, I think that having a perioperative team go through the formalized educational process together, would probably yield the best results.*

PSH learning collaborative is designed for interprofessional teams or institutions that are implementing PSH. The Healthcare Systems Engineering course is designed for individuals. Various clinicians and allied health professionals can join that course as individuals:

> *It's a graduate-level course. There are no exams in the course. The class is split into teams and each team has individuals from all the different identities. Each group in this class will have people from medicine and nursing and engineering and public health on each team. They then pick a real patient safety problem that they have to solve…*

Cautious implementation of networked learning. Optimism and a few positive examples of networked learning were contrasted with awareness of associated challenges. Networked learning in general sounds great, but the devil is in the details. Interviewees were very cautious while describing utilization of the same concepts. Main challenges: privacy protection of online learners, design and support for usage of collaborative tools, and need to combine online learning with hands-on experience.

For example, discussion boards are described as useful but enthusiasm is restrained. Sentences about usefulness usually end with "but":

> *Discussion boards can be okay, but again, people have to have time to log on to them.*

> *But, if you're part of a discussion board, you're just randomly commenting on something that doesn't assess your knowledge of the situation or your knowledge or understanding of the solution.*

Privacy protection. Interviewees were aware online learners' privacy is not well-protected under U.S. law (Louis B Swartz, Michele T Cole, & David A Lovejoy, 2010; Louis B. Swartz et al., 2010) and they showed extreme caution toward using any kind of clinical data. On the other hand, they noted that there is a wealth of valuable topics they can talk about without risk of sharing patient data or exposing a lack of knowledge.

> *I think there's plenty of other things that we could have chats about online, such as equipment use. How do you use this particular laryngoscope?*

Challenges with networked learning for specific topics. Participants were also concerned about the topics that might be taught through technology-enhanced learning. That was

especially noticeable among physicians concerned that technical procedures requiring a high level of expertise would "*not … work so well*" if delivered by collaborate TEL:

> *I think a class like that can in fact progressively be shifted into an e-Learning environment. I don't see a whole lot of difficulty with that. Where I see the difficulty is where you start to move into something like operating room safety because the barriers are very, very different.*

These comments show potential for more intensive utilization of networked learning for perioperative teams. We have a few good, but isolated, examples. The challenges described are significant. It may be hard to address them without well-designed, coordinated, collaborative effort.

That brings us finally to networked learning as a political and "turf" issue. A century-long fight between physician anesthesiologists and nurse anesthetists, competition between surgeons and anesthesiologists, and very hierarchical and siloed environment create context where interprofessional social capital is low. Connecting learners from multiple professions and connecting various professional organizations can be very challenging. For example:

> *Sometimes even when there are attempts to do that and have two or three organizations participate together, there's turf issues. I'm not talking about the license issues but like, "Well, we should be deciding on the course content, not you," and those kinds of things.*

Political will to bridge gaps between, for example, the surgery node and the anesthesiology and nurse anesthetist nodes, is described as a part of solution. Otherwise, antagonistic political forces and competition between professions will block any bigger interprofessional/networked collaboration.

> *…if the specialties got together, this is about political will. If the specialties got together and say, "You know, we want to do this and so each of us is going to have a place for interprofessional dialogue..." That's one way to do it.*

TEL as didactic, content-focused education

Content-focused TEL assumes that technology will be used to enhance established methods and, in essence, maintain the status quo. Therefore, it contradicts concepts of TEL as a communication and networked learning enabler.

That extrinsic contradiction can be related to two contradictions that are intrinsic to this theme. The first contradiction is between critical approach, arguing that didactic learning is not impactful, and comments alluding to that content is what learning is about. The second contradiction is between the description of benefits and challenges. A few participants explained that the benefits of content-focused education are that it can be easily created, and it can be enhanced by technology without changing the established mental models, or practices. Other participants describe the same issue as a trap that will make us believe that

we improved by "*moving from paper to electrons*," while in reality we missed the opportunity to utilize the benefits of the new medium.

For example, PowerPoint, click-through learning, and video recording of lectures were criticized as low impact learning models.

> *…do not learn on PowerPoint at all. They only keep about 2% of what they get off of a PowerPoint.*

On the quite opposite side of the spectrum, one participant described interprofessional team-based learning just as another way to deliver content/information to learners.

> *In team-based learning, you ultimately are trying to get the information into every single individual, but you're doing it in a team setting.*

Content-focused uniprofessional education was described by three participants as an easy way to deliver education customized for a very specific audience—with specific culture and mindset. Authors of content-focused education are, quite often, members of the same profession as the learners. They share the same culture, so cultural differences are not the issue. Content-focused education is primarily focused on content, not activities or impact. Therefore, for content-focused education the only critical link is an attractive content topic and good presentation skills. On the other hand, IPL and QIE require planning and coordination of content and learning activities that can match the needs of multiple professions, plus their roles and culture. In that context, each element of that IPL/QIE mosaic can serve as a critical link that can disrupt the learning experience.

> *The barriers are breaking down, and probably more of our CME material needs to be written to be appropriate for more people. It's tough, though, because when you write a CME piece, a CME work, you're trying to direct it to a very specific audience… you're designing it for one group of people.*

In addition to being an easy way to learn delivery, content-focused education is recognized as something we can enhance with technology, while still using the traditional learning mindset. Some participants recognized that as a good strategy. For example:

> *It can make a centralized location where you get all your information. It can help you distance learning…*

On the other hand, other participants were critical of how the technology is used or, arguably, misused for education. A common criticism is that we use new technology without a new practice that matches the new technology. As a result, a mismatch between technology and practices limit the improvement. One participant explained:

> *…they were simply moving from paper to electrons, and the electronic materials that they used were not for the most part active learning systems but were more repositories of materials that were written in electrons.*

The same participant explained that in later phases, interactivity was added. However, the underlying approach to learning did not change. The technology has become a tool to deliver the same old content-focused lectures:

> *…there would be a talking head who talked about why this was the best way or why this was not the best way, incorporated some of the evidence that's in the literature but it was… Even though it was individuals clicked on things and so it was interactive in the strongest sense, or maybe that's the weakest sense, it really wasn't interactive. It was just… it was a little bit more entertaining way to lecture.*

The previous themes describe TEL as a contradiction between the potential TEL has to address challenges and challenges it creates; between TEL as a tool that can simultaneously connect and divide. Those are complex relationships, and we usually need to engage theory to properly understand them. That brings me to the next theme: theory and TEL.

4.5.3 Theory and Improvement

TEL as something that needs to be backed up by theory

TEL theory deserves attention because analyzing complexity of healthcare TEL endeavors without some theoretical framework is hardly possible. For example, debate about TEL as innovation and TEL as reinforcing the old mindset would be much easier if arguments were grounded in strong theoretical frameworks. In the same manner, theory can better connect the dots in the there codes that follow:

- reflective learning (lack of),
- learning as arms race, and
- simulations (with siloed practice improvement).

Theory, Davidoff et al. (2015) explain, is reason-giving deeply embedded in all human endeavors. Without understanding the theories we use, whether those theories are personal beliefs or opinions, or peer-reviewed scientific theories, it is hardly possible to have any sustainable systematic improvement. Yet, the majority of interviewees, primarily medical professionals, were very critical of how their profession is treating learning theory, plus theory in general. Medical culture, they explained, perceives theory as something unknown, something that is not needed or not used. Nurses, on the other hand, were much readier to talk about theory, discuss differences between nursing and medical theory, and between various epistemological and ontological positions.

Theory is unknown and not needed. For medical professionals, the most dominant perception of social and learning theory is that it is something mystical, not practical, or something healthcare providers are not familiar with. It looks like the notion of theory shakes the ground under the widespread positivist and empiricist mindset that dominates medicine.

Therefore, medical professionals are not extremely interested in discussing it. One physician explained:

> *There's very little theory, so when you read the surgical literature, unlike education, unlike psychology where you have… the introductions that introduce the theory, there's almost no theory in medicine, it's almost all: We're trying to improve the health of patients and that's understood; so, we don't need any introductions. We just say, here is the general area, here is what we did. That's the way the article is. It's really nice because you can read a bunch of articles in one day.*

As a result, medical professionals, even in advanced academic roles, are not familiar with learning theory and may have an aversion of it. Insufficient use of theory in medical education is well-described in the literature (H. Barr, 2013; Watkins & Xie, 2014) and often used as an explanation why CME/CPD experience challenges in improving effectiveness, and QI interventions do not make a sustainable impact (Amin, 2000; R. D. Fox, 2012; K. V. Mann, 2004; Donald E. Moore et al., 2012). For example Davies et al. (2010) found that more than 75% of 235 studies focused on guideline dissemination and implementation strategies that they analyzed—did not use any kind of theory. One participant explained the context for that:

> *Most of the people at the [professional organization] are not grounded in educational theory. There's no educational theory, for example, involved in medical school at all. I did not understand anything about Bloom's taxonomy, Gardner's theory of multiple intelligences, Ericsson's 10,000 hours, or any of that stuff until I was asked to become an adviser for a PhD in education and I had to learn all of that stuff. I had been a professor in a major university for 25 years before I learned any of that stuff.*

TEL as simulations

Currently simulations are practiced as high-fidelity simulation exercises in simulation centers around the country. They play an important component in Maintenance of Certification process for physicians (McIvor, Burden, Weinger, & Steadman, 2012; Ross & Metzner, 2015; Weinger et al., 2017) and Re-entry Program for nurse anesthetists (Heyes et al., 2018). In addition to that, a few online—screen-based—simulation offerings at various levels of complexity are available. However, online simulations were not mentioned in the interviews. High-fidelity simulations are internationally recognized as a tool to deliver interprofessional training (Decker et al., 2015; Reeves & van Schaik, 2012; Robertson & Bandali, 2008). Simultaneously, it is an expensive tool associated with financial and organizational issues (Green, Tariq, & Green, 2016).

Simulations becoming interprofessional. Many participants described simulations happening in simulation centers or in situ (hospitals, operating rooms) as established tool to deliver high-quality interprofessional training. Although simulations are often happening in an

uniprofessional manner, participants feel that that uniprofessional approach is becoming more the exception than the rule (Seymour et al., 2013).

> *If you want people to work in a team, obviously, the simulation has to be those kinds of things because otherwise it just continues to reinforce the old way where it's, "Well we're over here and you're over there and the other person is in another camp."*

Location of simulations. In the U.S., high-fidelity simulations in simulation centers seems to be the dominant way to deliver the simulation experience, while in situ simulations are gaining more traction (Patterson, Geis, LeMaster, & Wears, 2013; Sørensen et al., 2017). In situ simulations are happening in the same hospitals where teams practice. The participant from Europe explained that in situ simulation can be a realistic and stressful situation: when the whole team rushes to address an emergency and when they come in the operating room they see a plastic patient. When that happen, they know that their performance is monitored.

> *A lot of stress has been placed on communication and practicing within groups and teams... When the entire training of what happens in an operating room is delivered to the entire OR team. Anesthesiologists, surgeons, and nurses don't learn by themselves, but all together. From reanimation to special situations, which can be a problem, some critical situations in operation rooms. This is how we practice.*

Simulations integrated in the learning continuum. The participant from Europe described how simulation are well-embedded in the learning and QI continuum. Simulation can be used to diagnose and improve non-optimal processes in organizations—including quality and patient safety (Schofield, Welfare, & Mercer, 2017). Simulations are often combined with theoretical learning as preparation for the simulation exercise and reflective learning after simulation. Very often, teams and individuals are analyzing their actions in the simulated situation, reflecting and preparing improvement plans.

> *This is one part of the training. It's something like flight simulation, when you're training to be a pilot. There is the theoretical part of the training, where all team members are in a lecture hall listening to lectures, but then this is the second part, where we practice all of this in our hospital.*

Financial and organizational issues are recognized as important factors. For example, sending the whole OR team to a simulation center may be a very costly endeavor (cost of simulation + travel + accommodation + cost of not working). On the other hand, organizing in situ simulation may receive resistance too.

> *Are you going to now turn this operating room into a simulation? No. Will you take the operating room out of circulation and do a simulation instead? They do, they do … but that's probably more logistically feasible than bringing them to our center. It turns out to be really hard to do.*

European vs. American simulation experiences. One interesting thing is the difference between description of simulation experience in Europe and the U.S. While the European participant gives strong description of integration between simulation and wider CPD framework, and change of clinical practice, U.S. participants did not describe such connections. They described simulations in simulation centers, followed by debriefing and abstract conceptualization (part of the Maintenance of Certification process). However, they did not mention how simulations are integrated with the rest of the CPD enterprise or improvement phase that follows simulation. That is at odds with findings of A. West and Parchoma (2016) and Shahoumian, Parchoma, and Hanson (2014), which convincingly describe simulation-based learning as a complex intervention created through a tight network of human, technical, and conceptual actors. Interaction between elements of the network enhances simulation-related learning and innovation.

Limited support during performance improvement phase. The connective, and knowledge co-productive, nature of simulations is similar to networked learning (A. West & Parchoma, 2016). However, that is a noticeable feature only in simulation centers. In the simulation center, learners have intensive simulation experience, they reflect on that, and conceptualize how to do it better. After coming back to their practice, learners are emotionally loaded and eager to implement new concepts in complexity of their daily practice. They are requested to create a performance improvement plan and reflect on its implementation. However, during this performance/quality improvement phase they receive only limited support—they have no direct support from their peers or teachers.

Figure 44 illustrates the simulation-generated practice improvement process (Stocker et al., 2014; Zigmont et al., 2011). In essence, it is Kolb's Experiential Learning Cycle. It is important to notice that, based on the comments from the U.S. interviewees, the first three phases are delivered in a very collaborative manner, and participants felt well-supported. However, they didn't share the same opinion about the last phase. That may be a weak link that is contributing to the limited impact of simulation training described in the literature (Green et al., 2016; Lorello, Cook, Johnson, & Brydges, 2014). To address that, and improve overall impact of the simulation programs, more robust support and networking of participants during the fourth and final phase might be needed.

Figure 44. Simulation learning experience presented through Kolb's experiential learning Cycle process (Based on: Stocker et al., 2014; Zigmont et al., 2011).

TEL as framework for reflective learning

Reflective learning is interesting code because it is mentioned by only one participant.

> *Basically, learning from previous conduct, previous experiences, previous results, and try to see how you can go ahead and do it better.*

This finding is at odds with literature (Barley, 2012; K. H. Leung, Pluye, Grad, & Weston, 2010; K. Mann, Gordon, & MacLeod, 2007), and maintenance of certification practices (revalidation) in UK and Australia (J. Archer & de Bere, 2013; Caesar, 2016; L. Roberts, 2015). Literature has been describing reflection as an essential tool of professional development—helping learners to integrate theory, new skills, and practice to enhance their performance (K. Mann et al., 2007). Reflective practice has become a central theme in portfolio-based maintenance of certification practices in such countries as UK and Australia (Caesar, 2016).

Finding that reflective learning, as well as learning healthcare system—discussed on page 105—are not terms participants mentioned in context of QIE/IPL and TEL, suggests that there may be need to better integrate those concepts in the U.S. perioperative context.

Learning as arms race

Interviewees from nursing, surgery, and anesthesiology groups expressed concerns that there is a gap between long and expensive academic training and improved impact on patient care. The main concern was that if teamwork is lacking, even the best-educated team may

experience challenges to deliver high-quality care. Therefore, instead of focusing solely on education, perioperative professionals should focus on education and teamwork.

For example, one clinician noted:

> *So highly professional and highly educated does not necessarily equal quality*

One participant compared the current "competition" between non-physician and physician healthcare providers as an education race that is in many ways similar to the arms race between the U.S. and the former Soviet Union during the Cold War. Competitors are looking for measurable, publicly recognizable artefact they can use to compete, forgetting that the competition in many ways undermines their potential to deliver teamwork needed for successful patient care. Therefore, all professions involved are putting the focus on traditional university education and well-recognized degrees, while lifelong learning and teamwork are treated as secondary or not important.

> *People are trying to respond to desires to improve their own profession … and they see the only way to do this is through formal [uniprofessional] education processes, but I'm not certain what anybody is getting out of all those in the end.*
> *Not that that's bad, but it's not like they're really promoting teamwork or they're working more clinically or they're developing new clinical skills*

> *Because the arguments always seem to center around education. The answer for all the allied professions is, "Okay, well, we'll just get more education." I'm not sure that's really a rational approach. It's kind of like the arms race. They're always just trying to keep up with one another and say, "Well, we get the same amount of hours or we get the same amount of clinical experience or we have the same amount of courses or we use the same book." Whatever the case is, somewhere along the line things got a little confused."*

4.5.4 In sum

TA of TEL in perioperative context drew a dynamic picture shaped by contradictions between challenges TEL is addressing and challenges TEL is causing, as well as the role TEL has in maintenance of status quo or support of innovation. Those contradictions are deeply imbedded in our social structures and related to QIE and IPL implementation. In the chapter that follows I will discuss the interaction between perceptions of the analyzed phenomena. That will include the description of a mechanism that is shaping the complex and perpetually contradictive nature of that picture.

5 DISCUSSION

As complex as things are today, everything will be more complex tomorrow.

—Kelly (1994)

5.1 INTRODUCTION

In the previous chapter—Findings—I drew a picture of how QIE, IPL, QIE/IPL, and TEL are perceived. With that, I answered the first two research questions. In this chapter, my goal is to dig deeper and find what are the implications, and what are the underlying forces shaping perceptions. I will discuss findings through the lens of critical realist ontology. With that I will answer my third research question.

To achieve that I will:

1) analyze how perceptions of QIE, IPL, and TEL interact.
2) reflect on dynamic of worldviews presented by the interviews.
3) compare LHS as described by the Institute of Medicine, with QIE and IPL needs described by participants, and
4) theorize on a mechanism shaping perceptions of QIE, IPL, and TEL.

Theory is expected outcome. Research informed by critical realism looks to describe the underlying social mechanism that is shaping the phenomena of interest. It looks to answer the "why" question (Dalkin, Greenhalgh, Jones, Cunningham, & Lhussier, 2015). Consequently, critical realist research of social phenomena are profoundly theoretical, and as Edwards, O'Mahoney, and Vincent (2014, p. 13) explain: "*The good researcher must be to some extent a theoretician*." Therefore, one of the outcomes of this thesis is creation of a theory that describes an underlying mechanism.

The theory uses Bawden's (2010) matrix of worldviews to map the mechanism guiding evolutions of complex adaptive/learning systems through four phases: egocentric, technocentric, ecocentric and holocentric. Since our social and biological reality exist as an agglomeration of nested complex adaptive/learning systems (Gerrits & Verweij, 2013; Jordan & Mcdaniel, 2014), this mechanism can affect all elements of our reality. The theory sheds light on the complex dynamic affecting all parts of perioperative care—from individual clinicians to LHS. Therefore, the main arguments presented in this discussion can be better understood through that theory.

The arguments are:

- **QIE, IPL, and TEL in perioperative context** are interrelated, complex phenomena. Therefore, instead of looking for a simple solution for a complex problem, we should invest in understanding complexity of the system and how to better "dance" with the complexity.
- **Perioperative teams** are made up of professionals with different worldviews; different ontological and epistemological preferences. To address increasing

complexity of healthcare delivery, we need to benefit from that diversity and engage multiple epistemological positions that different stakeholders bring to the table. Therefore, instead of standardizing the worldviews of diverse team-members, a better solution is to empower teams with skills to better combine different worldviews and engage multiple epistemologies.

- **QIE and IPL are increasingly social constructs**. They should be supported by holocentric LHS. Institute of Medicine, thus far, has provided detailed descriptions of technocentric and managerial aspects of LHS. Therefore, complexity and social aspects of LHS needed for QIE and IPL are yet to be addressed.
- **QIE and IPL can be observed as subsystems of LHS**. They evolve through all four stages of Bawden's model: egocentric >> technocentric >> ecocentric >> holocentric. The theory may help us navigate more quickly to the desired holocentric modality, and better understand relationships between systems in the loosely nested hierarchy of LHS.

5.2 QIE, IPL, & TEL IN THE PERIOPERATIVE CONTEXT

In this section I will start by recapping answers to the first two research questions—how QIE, IPl, QIE/IPL, and TEL are perceived in the perioperative context. While detailed answers to those two questions are provided in Findings (p:92), the summary of answers here will serve as building blocks of analysis of interaction between phenomena.

In the sections that follow, I will analyze worldviews that are shaping those perceptions, as well as the LHS macro-system where the analyzed phenomena are located in.

5.2.1 Phenomena

The intrinsic characteristics of phenomena described in TA are:

IPL is described through five themes. Those are IPL as: 1) learning modality, 2) set of benefits, 3) set of challenges, 4) set of actions we must take, and finally 5) IPL as something that is lost in time. As a learning modality, IPL is perceived as a very versatile method—where even didactic lectures, if they allow interaction between participants, can have very beneficial IPL characteristics. As a socially constructed entity that in many ways challenges traditional perceptions of learning and collaboration, IPL evokes intense feelings and opinions. Yet, for many participants, it is still an emerging entity. It is perceived "from a distance," not as something they had long intimate experience with. Through that 'long distance binocular' IPL is seen as a list of benefits and challenges associated with it. Benefits are primarily intrinsic to IPL—those are outcomes IPL can achieve for us. On the other hand, challenges are primarily extrinsic—they are caused mainly by society resisting changes associated with IPL.

Participants described various ways existing culture, rules, and division of labor are obstructing IPL. Attractiveness of benefits and strong contradictions between benefits and challenges serves as a platform for a series of perspectives that describe IPL a as project we must implement. It is a strategic and ethical question leaders should tackle. Finally, a small theme that illustrates complexity/ambiguity of IPL, called "lost in time," showed that there is no shared understanding of how old IPL is. Based on that, we can assume that participants from various healthcare contexts were exposed to different formats of IPL (or not exposed at all), or that they have different criteria to define what IPL is.

QIE is very often perceived as a variation of QI, or on a few occasions, a variation of IPL. Connection with QI gives QIE instant likability. Nobody will argue against quality improvement. On the other hand, underlying assumptions of how quality is practiced shape perceptions of QIE. Interchangeable use of terms describing various quality-related activities causes confusion. For example, quality improvement and quality assurance are fundamentally different processes. One is focused on making improvement (creating something new and innovative), and the other assures compliance with established standards. Yet, since they are interchangeably used as substrate for QIE, based on underlying beliefs about quality, perceptions of QIE will significantly differ in many dimensions. Therefore, a crucial question that propagates the whole system is: Is QIE focused on improvement or standardization, and how do those two processes interact?

QIE/IPL as a phenomenon created through interaction of QIE and IPL has proven to be a valid, recognized phenomenon. Participants have described nine very different systems created through QIE and IPL interaction. On the other hand, one perception described no interaction between them. Therefore, while a majority of participants perceive interaction of QIE and IPL as a new, recognizable phenomenon, there is no shared understanding of how QIE and IPL interact and shape QIE/IPL.

TEL is described as a phenomenon deeply embedded in the professional development of perioperative clinicians, and loaded with contradictions. TEL simultaneously can act as a tool to address emerging challenges, as well as a source of challenges; it can be simultaneously a communication enabler and a tool to support the traditional, didactic, content-focused, and usually siloed education. Finally, while some participants describe TEL as a complex socio-technical phenomenon that requires strong theoretical foundations, others perceive it as a simple silver bullet for many of our problems.

5.2.2 Interactions & contradictions

The TA described complex and connected phenomena that create a dynamic mosaic. Each phenomenon is shaped by a series of internal contradictions, interaction with the context and interaction with other phenomena. Due to the connected nature of the phenomena, contradictions seemingly internal for a specific phenomenon can propagate the system.

A noticeable example is how the dynamic inside the QI phenomenon impacts the rest of the system. Contradiction between perception of QI as a process focused on improvement and innovation, and perception of QI as a process focused on maintenance of established standard (status quo), influence directly how QIE and QIE/IPL are perceived, and shape the perceived role of IPL. Figure 45 illustrates the nested nature of the system and how contradictions inside QI propagate this nested system.

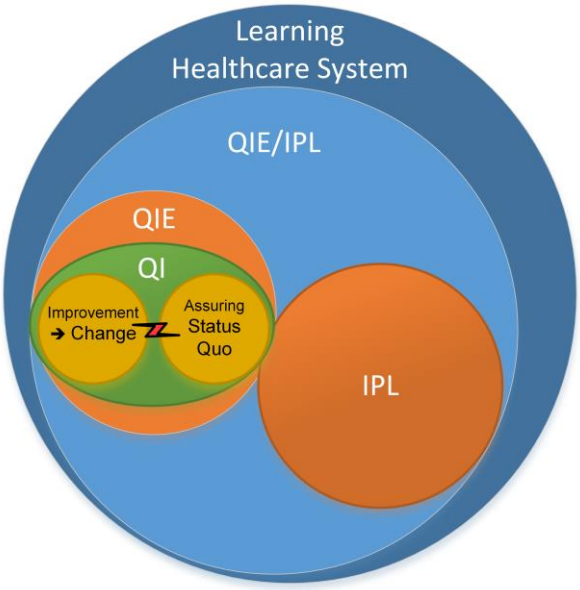


Figure 45. Conflicts between different natures of QI propagate the nested learning system.

Another vivid example is QIE/IPL. Perceptions of QIE, IPL, and underlying epistemological assumptions create numerous and various perceptions of QIE/IPL—as described on page 129.

More subtle interactions. While some interactions are immediately visible, many others are subtler. For example, contradictive perceptions of TEL as tool to address challenge vs. as a source of challenges, and as change enabler vs. status quo enabler, can influence how QIE and IPL are perceived. Quite often, more TEL is described as a change enabler and tool to address emerging challenges, more favorable descriptions QIE and IPL received. However, that is not a hard rule.

Stability of IPL. While QI, QIE, and QIE/IPL are very dynamically connected, in this mosaic IPL acts as the most stable, semi-autonomous phenomenon. Although it is influenced by the context, the perception of it will not be significantly transformed by different perceptions of surrounding phenomena. Therefore, IPL can serve as a stable foundation for discussion of various QIE, LHS, and IPL-related concepts.

Analyzing multiple levels of systems. It is worth noticing that initially I didn't plan to analyze perception of QI. However, since perceptions of QI have a profound impact on the entire

system, I had to include it in the analysis. In the same manner, the supra-system—LHS—was not a focus of my attention initially. I had to include LHS in the analysis due to nested connections between the supra-system and subsystems. As a result, I had four levels of analysis: QI—(QIE and IPL)—QIE/IPL—LHS.

Reproduce or transform, that is the question! The main contradictions I found inside the analyzed phenomena can be interpreted through the lens of benefits and challenges of each phenomenon and associated dilemma: Should we make the change and transform the system, or should we keep the system as it is? Even the contradiction around the nature of QI reflects the same question: Is the purpose QI to create improvement, change, and innovation, or does QI—practiced as quality assurance—have a role to maintain the system as it is (assuring that the established standards are maintained)? In its essence, that's the classical binary question between two outcomes of human agency. We can reproduce the social structures, or we can transform them (M. S. Archer et al., 1998).

Various perceptions of QI play significant roles in that dynamic. Therefore, questions like: "*Are QIE and IPL the same?*" or "*How similar they are?*" elicit this conditional answer: It depends on how we perceive quality improvement. If quality improvement is perceived as quality assurance, maintenance of status quo, or a punitive system (p:127), then QIE and IPL can be significantly different. Assuring that the system maintains traditional standards means recreating traditional—often siloed and hierarchical—social structures. Those structures contradict concepts of IPL. However, if QI is perceived as an innovation and improvement-focused framework that empowers all team members to improve, then QIE will be an interprofessional learning endeavor. In that case, QIE and IPL will act as two lenses seeing the same thing: constantly improving LHS—as hypothesized on page 52.

5.2.3 Comparing IPL and QIE activity system diagrams

Activity system diagrams map how and where participants believe phenomena is affecting the system, and what are the dynamics between various perceptions. The most noticeable difference was in benefits and challenges.

Benefits. While comparing IPL and QIE activity system diagrams (pages: 118, 123), I noticed interviewees better described awareness of IPL benefits than QIE benefits. For example, while IPL was vividly presented as a tool to enhance teamwork, connect stakeholders, and enhance learning in organizations, benefits of QIE are described primarily indirectly—through the lens of QI. That doesn't mean that benefits of QIE are not significant, but that they are perceived primarily as benefits of QI. In other words, QIE lives in the shadow of QI. Therefore, it may happen that, because of focus on QI, we don't notice a need for investment in QIE. Furthermore, benefits of QI are obfuscated due to a contradiction between perceptions of QI

as quality assurance—and focused on maintenance of the current status—and QI as an innovative and transformation-focused activity.

Challenges. Activity system diagrams showcase numerous challenges associated with IPL. Those challenges are associated with rules, community, and division of labor. Significantly fewer challenges related to QIE were described. Since IPL is perceived as a social construct that is improving performance of teams and organizations, it is causing disturbance in the bottom, social part of the activity system. On the other hand, QIE is associated with a smaller number of weaker "social" challenges. Probable reason is that QIE as an extension of QI is often perceived as:

- a technical application of QI principles, or
- quite variable, and
- established practice.

For example, such QI practices as "quality assurance," "bureaucratic rules," and "corrective measures" have a long history. As they are well known and may be already in use, there are no significant barriers affecting their implementation. Simultaneously, since perception of QI covers a variety of different practices—from a punitive system focused on maintenance of status quo, to quality improvement interventions focused on transformative improvement of the system—each organization can practice QI modality that fits their organizational culture. Therefore, organizations can practice some kind of QIE without changing the system.

Perceptions transforming the system. IPL activity system diagrams (pages: 97-101) show quite significant differences our perceptions can have of a learning system. Live CME/CPD meetings such as yearly conferences of professional organizations can simultaneously be perceived as a series of didactic lessons, and as an important event in a continuous networked, social learning process, where didactics play just one (smaller) part. While it is possible to argue that it is just a "difference in perceptions," such differences can have a transformative impact.

Critical realism explains that social structures are simultaneously a prerequisite and a result of human agency, and human agency simultaneously rebuilds the established social structures, as well as creates new, transformative structures (M. S. Archer et al., 1998). Human agency is significantly influenced by objective social structures. However, perceptions of social structures and processes make an important mediatory step between many social structures and human agency. Different perceptions of social structures can initiate different actions. Therefore, different perception of live CPD meetings will alter human agency, and the altered human agency will reshape live CPD meetings (Figure 46).

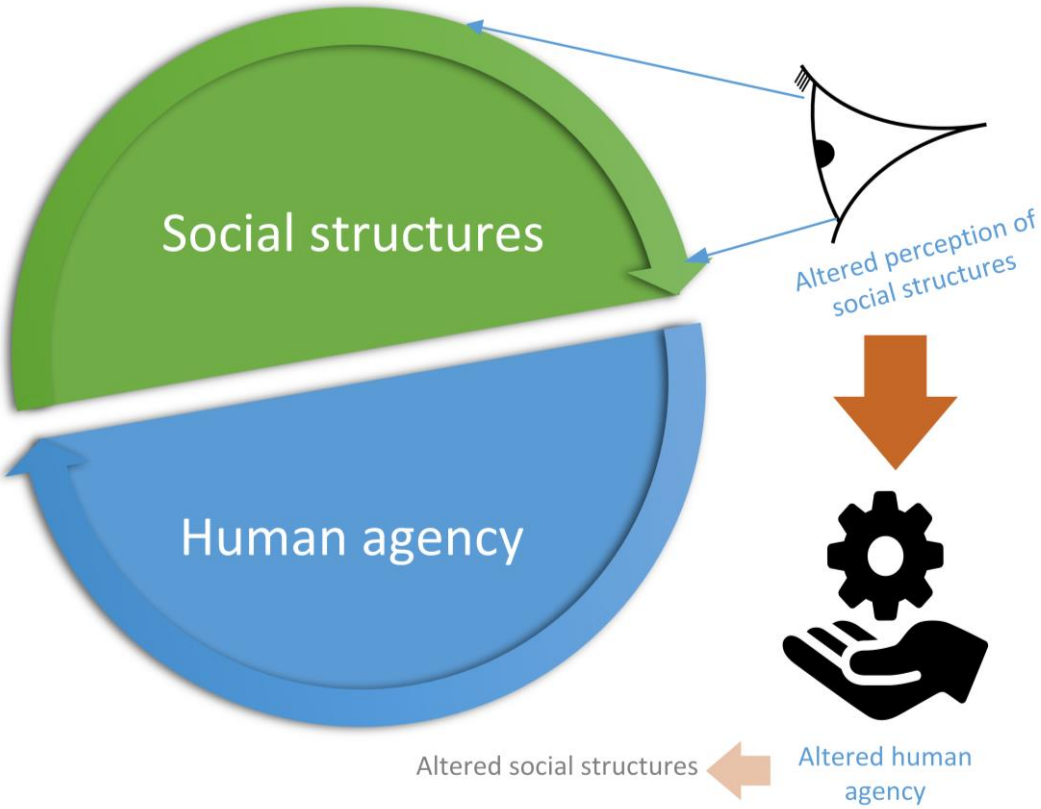


Figure 46. Social structures and human agency —interplay when perception of social structures is altered.

M. S. Archer (2003) explains that interplay of structure and agency is done as a combination of 1) objective structural and cultural properties, 2) subjective internal configurations of beliefs of agents, and 3) subjectively selected actions aimed to address objective circumstances. Therefore, it is important to understand configurations of beliefs and subjective reasons guiding why we as individuals or groups/professions take specific actions.

That leads me to ontological and epistemological differences described in the TA.

5.3 Ontological and Epistemological differences

Initially in this TA I didn't look for differences between how different professions perceive the analyzed phenomena. Due to a high number of different professions (four subgroups of clinicians and four subgroups of CPD professionals), complexity of the analyzed phenomena and self-selected nature of participants, I was not able to gain insight into differences between professions. In most cases it looks like differences in personalities, age, and seniority of participants played a bigger role than professional affiliation. Yet, there are a few exceptions where participants provided a vivid description of differences between professions; mainly between medical (physicians and anesthesiologist assistants) and nursing worldviews.

The participants described different ontological and epistemological views and—related to those worldviews—different affinity for QIE/IPL and collaborative TEL, as well as a different

approach to theory. Theory is an important tool in addressing educational and QI questions in a complex perioperative context. That makes different approaches to theory an important factor.

Improving worldviews? The nature of those worldviews and differences between them are pertinent for QIE and IPL discussion. Bawden (2010, p. 8) convincingly explains that worldviews are the "*most fundamental belief positions*." They are part of our identity, of who we are, how we do business and—how we learn. Therefore, it may be hard to recognize them, and even harder to change them. The fact that communication between people and groups (professions) with different worldviews is usually distorted solidifies our worldviews. We are nurturing our worldviews in our own silo. That is why insight into the nature of those worldviews, and insight into the dynamic between them may help us better manage our worldviews, associated leaning system practices, and—pertinent for this thesis—better manage implementation of QIE and IPL.

Many differences between nursing and medical worldviews are documented in literature (Garman, Leach, & Spector, 2006). Medical culture is rooted in reductionism and objectivism (Ahn, Tewari, Poon, & Phillips, 2006; J. A. Greene & Loscalzo, 2017)—resulting in what Bawden (2010) calls a technocentric worldview. On the other hand, nursing professionals are prone to use more holistic and contextual thinking (Barnard, 2002; Hoeck & Delmar, 2018; Miriam, 2018). Therefore, they have a more holocentric worldview. That may explain why, as an interviewee explained, nursing students are more eager to actively participate in IPL and collaborative TEL than medical students.

In this discussion, I build on Bawden's model of worldviews. The model—described in Literature Review (p:52)—uses our ontological (relativism/objectivism) and epistemological (holism/reductionism) positions to map our worldviews. The model is adapted by providing examples of organizational and philosophical models used in the healthcare system.

Our ontological and epistemological positions shape four major types of learning systems: egocentric, technocentric, ecocentric, and holocentric (Bawden, 2010), as Figure 47 illustrates.

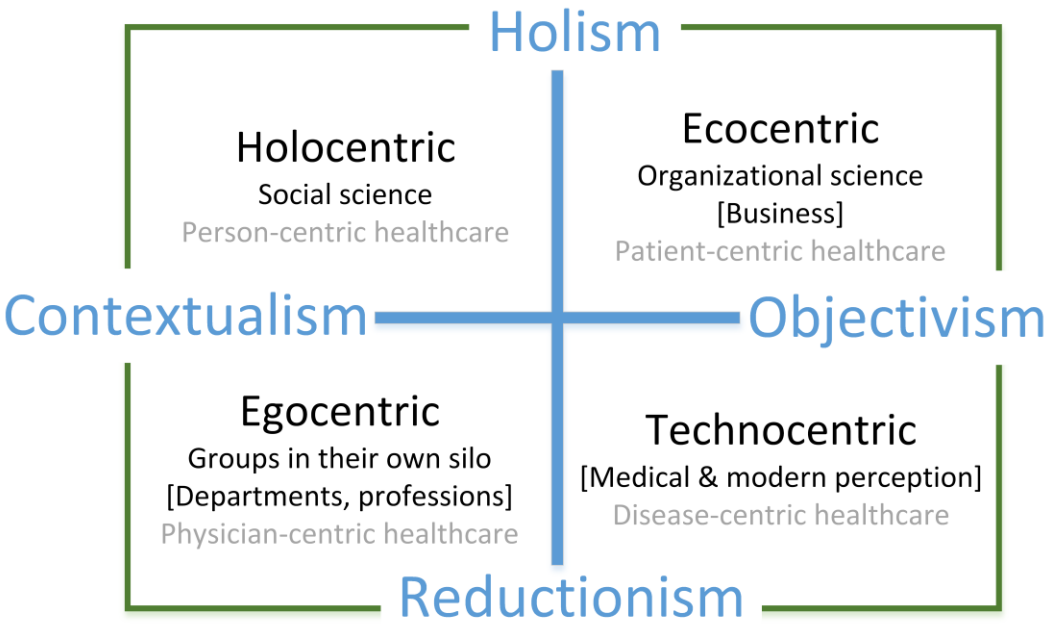


Figure 47. Worldviews and four unique perceptions of Learning (Healthcare) System. (Adapted from: Bawden, 2010. Used with permission.)

- **Egocentric modality** is used by closed groups in their own silo. It focuses on the needs of that silo. Relativistic thinking allows the group to interpret things in their unique ways. Reductionist worldview allows groups to focus on a few elements they are intimately connected with—a few elements in their silo, while ignoring everything else. In many ways, this is our default learning system. Whether we are talking about learning in primitive pre-historic villages or about focused, profession-specific education—the default is egocentric. Departments or professions that are focused on their own learning needs and during that process have limited interaction with the external world are examples of such a system. The traditional physician-centric healthcare built around professional prerogative (Berwick, 2016) aligns well with the egocentric modality. It entrusts physicians to practice their own unique medical craft without significant input from patients and society.
- **Technocentric system** is focused on technology, and belief that technology will change the world. It is still rooted in simple reductionistic mindset, yet it fosters objective and shared truth. Therefore, it avoids complex, social issues. As a noticeable "upgrade" from the egocentric default, technocentric worldview is very popular. The idea of a learning healthcare system, as presented by the Institute of Medicine (IoM, 2007, 2011; Wyer et al., 2014), and modern perception are examples of a technocentric learning system. The disease-centric medical model that reduces patients to objectively measurable symptoms of disease and customers who need those symptoms removed (Wahlqvist, Gunnarsson, Dahlgren, & Nordgren, 2010), aligns well with the technocentric mindset.

The technocentric mindset often shapes TEL. Therefore TEL can be presented as a quick, magic solution that can address complex societal and educational problems (Salomon, 2016). Those problems are sometimes real, but sometimes they are completely fictional. Morozov (2013) describes "technological solutionism" as the practice of inventing fictional problems, and providing technological solutions for the same problems. The belief that technology is the magic bullet creates environment where technological solutionism can flourish.

- **Ecocentric approach** (from Greek: oikos, "home" and kentron, "center"), is often used by big organizations that recognize the need for objective, measurable outcomes, and the need for system-focused approach. The system is perceived as a well-organized home (therefore the title: eco-centric). Patient-centered healthcare aligns well with the ecocentric model. It recognizes holistic needs of patients, but everything is observed through a lens focused on objective, measurable elements. Concepts of value-based care—like medical home and perioperative surgical home—where healthcare teams collaborate with patients to deliver optimal and complete care for each patient—are examples of ecocentric mindset. It is not a coincidence that those concepts contain the same word in the title—home.
- **Holocentric model** takes a holistic approach toward organizations and individuals. It recognizes their complexity, variation of shapes and forms, as well as that the whole is greater than the sum of the parts. Critical thoughts and activity of humans as individuals and society is perceived as the main solution. Person-centered healthcare aligns well with holocentric system (Koch, 2013; Miles & Asbridge, 2017). It recognizes full social, intellectual, emotional, and spiritual agency of patients.

  In comparison, patient-centered and disease-centered approaches perceive patients as passive consumers of healthcare services or complicated biological machines that carry disease (Mezzich, Snaedal, Van Weel, & Heath, 2010; Miles & Asbridge, 2013, 2017)

Pluralism of worldviews for developing system. To summarize findings from the interviews, literature, and Bawden's model: medical culture is associated primarily with technocentric worldviews, nursing takes a more holocentric approach, and emerging team-based healthcare delivery models (PSH, ERAS…) are rooted in ecocentric mindset. Bawden's model maps relationships between those worldviews.

The question that arises is: what is the best combination for perioperative teams? For example, should all stakeholders move to a holocentric mindset? I will argue no. A properly functioning and developing system needs all mindsets, all points of view. While the system as a whole can progress toward more ecocentric or holocentric modalities, inside the system we need diversity.

Learning is a social, technology-mediated process. Healthcare technology, practices, and healthcare science are increasingly complex and socially constructed fields. Therefore, as van Baalen, Carusi, Sabroe, and Kiely (2017) convincingly explain, healthcare learning and decision-making is technology-mediated social process. During that process, clinicians, patients, and patients' families/caregivers exchange, evaluate, discuss, and combine various evidence and, ultimately, they craft a team opinion, and a series of decisions guided by that opinion. They combine various epistemologies. In addition to evidence-based medicine, van Baalen and Boon (2015) explain that at least three additional epistemologies play a significant role. Those are: *case-based reasoning*, *narrative reasoning,* and *healthcare as a simultaneously natural and human science*. The task for clinicians is not to select one of those epistemologies, but to take epistemological responsibility.

5.3.1 Epistemological responsibility vs. epistemic fallacy of evidence-based medicine

Epistemological responsibility. van Baalen and Boon (2015) convincingly argue that while clinicians have a responsibility to optimize decision-making to the best of their ability, the dominant EBM practices do not provide complete support for that task. While decision-making in the clinical context is usually a complex social process that involves multiple stakeholders (various clinicians, patients, insurance providers), rule-based logic encouraged by EBM addresses only part of that complexity. It empowers clinicians to fulfill only part of their responsibility while a significant part of the responsibility is left unanswered and ignored. Therefore, instead of mechanically following words of clinical guidelines, as EBM allows, clinicians should practice epistemological responsibility.

Limitations of EBM. EBM as epistemology strongly rooted in logical positivism does not support epistemological responsibility. Loughlin (2008) vividly describes EBM as child of logical positivism. Therefore, EBM strongly prefers objective and rational reasoning while avoiding anything related to subjectivity and personal. That separation is erroneous (Loughlin, 2009) and severely limits the ability of EBM to analyze complex, contextual culture-driven healthcare issues (Greenhalgh & Russell, 2009). The objective and subjective, rational and personal, are equally important parts of our reality. To optimally address all relevant parts of a patient's reality, clinicians must effectively use various epistemologies. This is what epistemological responsibility asks them to do.

To practice epistemological responsibility properly, clinicians need epistemological skills and professional drive to merge diverse data and epistemologies. They should actively and responsibly select and combine various epistemologies to gain deep insight into the patient's complexity. With that, they will create a comprehensive "picture of a patient." That picture

may call for immediate actions but can also serve as an epistemic tool that clinicians can use to further discuss the patient's condition or to elaborate on alternative hypotheses that may explain the disease or ways the disease can be cured (van Baalen, Boon, & Bluhm, 2017).

That epistemological transformation where evidence-based medicine (EBM) is the dominant epistemology is being replaced with epistemological responsibility (van Baalen & Boon, 2015) may address many vigorous debates about EBM and decision-making in an interprofessional perioperative context.

EBM has a vital role. Nobody can argue against the importance of good objective evidence. Yet, EBM has become a positivist mindset focused on generalizable evidence and algorithmic decision-making (Goldenberg, 2006). It attempts to standardize, decontextualize, and simplify complex social processes and deliver universal truth (Brives et al., 2016). As such it is often used as a tool to disqualify other epistemologies. Therefore, while EBM makes significant contributions, it can prevent creation of comprehensive picture of the patient.

Going back to the roots—ontology. It is interesting that the concept of epistemological responsibility proposed by van Baalen and Boon (2015) aligns quite well with the description Guyatt used when he introduced the term evidence-based medicine in 1991. Guyatt (1991) suggested that instead of looking only for an authoritative source like a textbook, or authoritative peers, clinicians should look for new publications pertinent to the health challenge they are addressing, critically appraise those studies, do knowledge synthesis, and when strong evidence is not available—use systematic decision-making processes. That article called for different epistemologies and, I would argue, it called for epistemological diversity and "epistemological responsibility" of clinicians. Djulbegovic, Guyatt, and Ashcroft (2009) reiterated similar thoughts 18 years later.

Despite attempts to present EBM as a tool to connect various epistemologies, it looks like EBM was mis-used. The algorithmic approach to clinical decision-making, heavy reliance on authoritative sources, and removal of social context have become an important aspect of EBM (Goldenberg, 2006; Greenhalgh, Howick, & Maskrey, 2014).

Call for EBM was often interpreted as a call for reductionist and positivist epistemiology. As a result, in a recent article, Djulbegovic and Guyatt (2017) stress that the biggest challenge for EBM is lack of comprehensive theory of decision-making that connects EBM with other epistemologies (*decision science discipline* is the term used in the article).

How can we explain that contradiction?

For a long time, I was puzzled by contradictions imbedded in EBM. Only after I engaged critical realism was I able to understand the root of those challenges.

EBM suffers from epistemic fallacy. Positivists thought often confuse epistemology with ontology (Bhaskar, 2008) —causing epistemic fallacy. Epistemic fallacy is belief that

ontological arguments about the nature of our world can be reduced to epistemological statements about our knowledge. Therefore, ontology of EBM is habitually reduced on what can be observed through positivist epistemology. Positivist epistemology, Heisenberg (1971, p. 213) convincingly explained, divides our world in two parts; one "*we can say clearly, and the rest, which we had better pass over in silence*." Ontology created through the lens of that epistemiology is severely reduced, crippled—so it cannot serve as a glue that connects various epistemologies. That glue is an essential part of complex decision-making—as the metaphor of elephant and blind men—page 61—illustrates.

Practical example of epistemic fallacy

The following is a short story I used recently to illustrate the nature and seriousness of epistemic fallacy:

Imagine that you are a surgeon. You are in the operating room getting ready to start the surgery, doing final checks. In this context, logical positivism works very well. You look for objective knowledge grounded on factual evidence and firm logical rules. You ask your team, "Is this the right patient for this surgery?" You don't want a qualitative "majority of the team thinks . . ." answer. You expect a very objective, mathematically precise "yes" or "no" answer. "Are we doing left kidney surgery?" You are probing another critical element. You don't want "We feel it may be the left one." You need a 100% certain firm answer. That kind of reasoning is needed in that context. The patient's breathing, temperature, pulse, all should follow very objective rules—otherwise the surgery should not start.

Challenges may surface when you assume that the world is created the same way as you create knowledge and make decisions in the operation room.

This is epistemic fallacy.

Based on this assumption, you will believe that the world is created through only objective, measurable, rational things. Everything else doesn't exist or is not relevant. Therefore, later, when you discuss with the patient's family, social worker, or educators, and they present you qualitative, subjective data, you will find that the qualitative ideas they talk about don't fit in your very objective world. You will politely say, "Yes, yes, I understand what you are saying," while privately thinking — *Why are they talking about that? It is completely irrelevant. The things they said don't fit the "objective world" we live in*.

This can easily become a vicious circle where

➔ due to mistrust in qualitative data

➔ you have very limited experience with qualitative data

➔ inexperience with qualitative data gives an illusion that qualitative data is not relevant

➔ this confirms your belief that the world is made only of objective measurable things, and everything else can be ignored

➔ you do not trust qualitative data

Ultimately, your ability to properly analyze all relevant quantitative and qualitative aspects of patient care is being reduced only on the quantitative part of the picture, while qualitative issues can be left unanswered.

That is the consequence of epistemic fallacy.

Epistemological responsibility provides a promising answer to that challenge. It connects EBM with other epistemologies. The name "responsibility" is a strong reminder that our task is not to stick with our favorite epistemology, but to responsibly analyze complex issues through multiple epistemological lenses; it is a reminder that recognizing and documenting our epistemological and ontological assumptions is an important part of sound decision-making process (McMillan, 2015).

Central virtue. Code (1984) coined the concept of epistemological responsibility, persuasively explaining that it consists of universal intellectual virtue and universal responsibility. While other epistemic concepts may be valuable for a specific task, practiced by specific actors in a specific context, skills in selecting proper epistemological tools are always critical. It is "a central virtue from which all others radiate" (Code, 1984, p. 34). Furthermore, individuals and teams actively shape their worldviews and have noticeable control over their decision-making process. Therefore, they are responsible for making proper epistemological choices.

Practicing epistemological responsibility. To do so, clinicians and clinical teams have to:

1) gain the required data and knowledge,
2) utilize reasoning/epistemology that matches specific issues they are investigating, and
3) actively and responsibly plan to select and combine epistemologies to generate the optimal diagnosis and treatment (van Baalen & Boon, 2015).

Terminology. Various authors interchangeably use alternative phrases to describe the concept of epistemological responsibility. For example, epistemic responsibility (Code, 1984) and epistemological responsibility (van Baalen & Boon, 2015) are obvious synonyms. Terms such as "epistemic cognition" (Eastwood et al., 2017; Kitchener, 1983) and "epistemic learning" (Bawden, 2010) describe the same thing but take more of a "doers" than "achievers" perspective. The term "epistemological responsibility" suggests that we learn and act on epistemological issues and underlines that it should be done responsibly. On the other hand, terms such as "epistemic cognition" and "epistemic learning" may be interpreted as merely preparation for "epistemological responsibility." They may be interpreted as follows: "After you completed epistemic learning, you will be able to practice epistemological responsibility."

Finally, van Baalen and Boon (2015) associate the term "medical epistemology" with epistemological responsibility. I am not certain that is a good move. Epistemological responsibility is the central intellectual virtue (Code, 1984), and it cannot be appropriated by one profession. Furthermore, epistemological responsibility means that we should responsibly select and combine various epistemologies while the term "medical epistemology" suggests that there is only one epistemology, or that there is one supreme epistemology we should use. This very much echoes the mind-set that caused the conflict between EBM and other epistemologies. Therefore, it should be avoided.

I will conclude that the term "epistemological responsibility" is more complete and more actionable than terms such as "epistemic cognition," "epistemic learning," or "medical epistemology." In the dilemma between epistemic responsibility and epistemological reasonability, I prefer the term "epistemological responsibility." It is a stronger, more precise term that clearly communicates that there is (1) science we can rely on while (2) responsibly practicing "epistemological responsibility," and (3) it clearly underlines that we are selecting epistemologies.

Power-balance between EBM and epistemological responsibility. EBM and epistemological responsibility are related concepts. Therefore, it is pertinent to define which one is the main concept and which is the subconcept. What is the power balance?

EBM, as a framework rooted in logical positivism, can be one of the epistemic tools that epistemically responsible clinicians may use. Arguably, it can be the most important and most commonly used epistemology—but it should not be the only one.

Evidence tyranny. Hoffmann, Montori, and Del Mar (2014, p. 1295) warned that without shared decision-making and utilization of versatile epistemological tools, EBM can easily become "evidence tyranny."

Shared decision-making is a process where interprofessional teams made of clinicians and patients collaborate and evaluate all sorts of evidence, ensuring that the epistemology they choose can translate into practice and improve care.

This is an important distinction: EBM is an important tool clinicians may use to execute epistemological responsibility—yet it is just one of the tools. It is good for specific epistemic tasks but not for all of them. For many other epistemic tasks, we have better tools.

EBM can benefit from epistemological responsibility and the use of other epistemic tools. Epistemological responsibility connects all relevant epistemologies and builds a coherent picture of a specific healthcare issue. Therefore, only through responsible combination of various epistemologies can we gain the full benefit of all epistemologies—including that from EBM.

The logic is simple. It is just like the tools in your home improvement toolbox; they will be most valuable if you can use them together. If you are left with just one tool, no matter how good it is (for example, combination pliers are my favorite tool), there is big chance that you will not be able to address the needs of your home improvement project.

If, on the other hand, we assume that EBM is the master system of epistemological responsibility, we suggest that EBM is "the supreme epistemology." With that, we drastically reduce our ability to select appropriate epistemologies and practice epistemological responsibility. Figure 48 below illustrates this difference. While epistemological responsibility as a master framework can nurture EBM and augment it with other epistemic tools, EBM as a master framework will significantly reduce our ability to practice epistemological responsibility. It will act as an "epistemological police" that penalizes the use of alternative epistemologies.

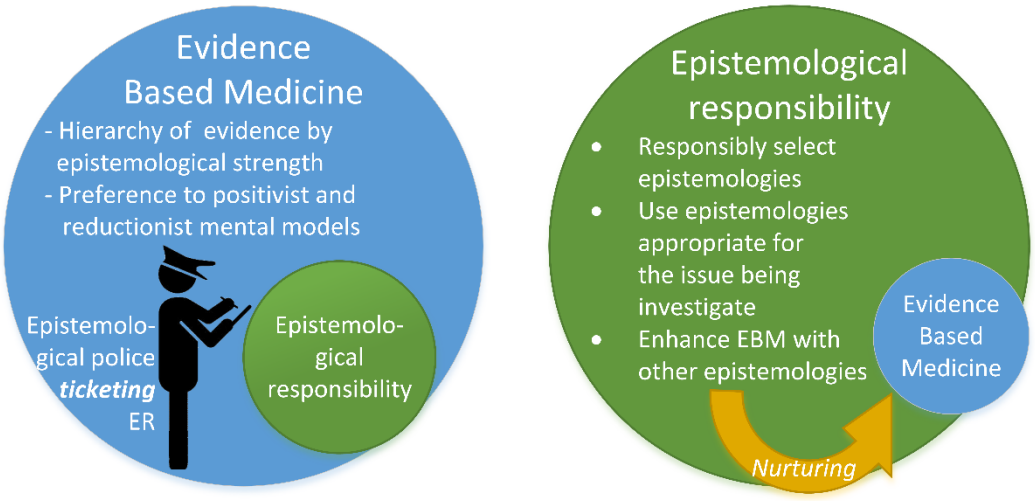


Figure 48 Two possible interactions between EBM and epistemic responsibility. In model 1, epistemological responsibility is a subsystem of EBM. Therefore, it is inhibited by limitations and stringent rules of EBM. In model 2, epistemological responsibility creates context where EBM and all relevant epistemologies can flourish to their fullest potential.

The table below illustrates differences in decision processes between EBM and epistemological responsibility.

	Evidence-based medicine	Epistemological responsibility
Selecting epistemology(ies)	Uses only logical positivism. Ignores all other epistemologies.	Actively and responsibly selects and combines epistemologies to generate diagnosis and treatment that addresses the personal and social complexity of patients, their caregivers, and communities.
Aligning epistemology with task and context	Uses only logical positivism. Ignores all other epistemologies.	Uses reasoning/epistemology that matches specific issues being investigated, as well as the context.
Gaining data and knowledge that match needs of:	Logical positivism	Various selected epistemologies
Focus is on:	Objective and codified knowledge. Knowledge exists as depersonalized universal truth.	Agency of knowers in very specific epistemological context. Clinicians and teams, as epistemic agents, use existing knowledge (concepts, theories, standards, laws) as epistemic tools to create new knowledge. This new knowledge is shaped by creators and context. Therefore, it cannot be well understood without at least a partial insight into who created it and how (Boon & Van Baalen, 2018).
Addressing multiple (interprofessional) perspectives	Recognizes only the medical perspective as a valid perspective and expects that all team members will adopt a medical worldview.	Recognizes that team members from different professions and different disciplines may have very different epistemological perspectives. Therefore, interprofessional teams need new meta-cognitive skills to understand how other professions and disciplines create and use knowledge (Boon & Van Baalen, 2018) and present their own professional perspective to the team (Boon, van Baalen, & Groenier, 2019).

Table 6. Evidence-based medicine and epistemological responsibility: a comparison.

Skills needed for epistemological responsibility. While epistemological responsibility may be a promising new tool in this context, having teams that can practice epistemological responsibility is the key. Perioperative teams with diverse mindsets have a better possibility to execute epistemological responsibility in its full potential. Deeper insight into ontological and epistemological diversity inside perioperative teams can have noticeable impacts on how fast and how good implementation of PSH happens.

We can learn from history. Various questionable and usually unrecognized ontological and epistemological assumptions (Bloom, 1988; Dall'Alba & Barnacle, 2007; R. D. Fox, 2012) significantly contributed why 47 years after the Institute of Medicine published their first big paper: Educating the Healthcare Team (1972), we are in almost the same position; and as Rayburn et al. (2017, p. xxv) explains, "*Change has been slow or nonexistent*."

5.3.2 Ontology and theory of science that can enhance epistemological responsibility?

Ontology and epistemology. Ontological and epistemological issues have a prominent role in this thesis. As I was doing this research, I became more and more aware of how our ontological and epistemological assumptions have a profound impact on our thoughts, our actions, and the world we live in. I described many challenges caused by improper or lack of any approach to ontology and epistemology. The recently mentioned epistemic fallacy is just one of them.

Selecting epistemology. As it usually happens with complex systems, there is no silver bullet we can use to address all challenges associated with ontology and epistemology. For example, epistemological responsibility is a continuous task—a continuous process. As the term "epistemological responsibility" illustrates, the selection of proper epistemologies is something we are asked to do responsibly when making an intellectual argument.

Selecting ontology. With ontologies, the situation is less dynamic. We are not asked to select ontologies whenever we craft an argument. However, we need ontology that will support our epistemological responsibility. The layered critical realist ontology seems appropriate for this task. I adopted critical realism while doing this research. It is a well-defined theory of science, and as this thesis illustrates, critical realism and its ontology can be valuable in clinical decision-making and in the domain of interprofessional healthcare TEL. They provide a strong foundation for epistemological responsibility. Therefore, I foresee that critical realism will play a more prominent role in healthcare decision-making and healthcare TEL.

Knowing that diverse mindsets in the system can improve decision-making, learning, and performance of the system, the question is: How should the system be set up? Which mindset

is best for the development of the system where perioperative teams will flourish? That will be addressed in the following section.

5.4 Missing link between QIE/IPL, TEL, and Learning Healthcare System

While it is important how interviewees described QIE, IPL, and TEL, it is worth noticing that they were not presented with the context of a learning healthcare system (LHS).

LHS is a system through which learning, knowledge, and, most importantly—performance of the healthcare system—are improved. It is a systemwide concept focused on learning and improvement, and popularized by the Institute of Medicine (Adinolfi, 2014; IoM, 2007, 2011, 2013a). Therefore, I thought that the term LHS would be often mentioned in the discussion on QIE, IPL, and TEL of perioperative teams. However, that didn't happen.

Two visions of a learning healthcare system. The question that puzzles me is: Why was there not one mention of LHS or a learning system during the interviews? And why in follow-up communication, one participant with an advanced degree in education, noted: "*I have never heard/read that term [LHS]*."

The explanation I corroborated with 4 research participants in follow-up communication, is that the Institute of Medicine shaped perception of the LHS. The Institute provided two visions of LHS: one primarily technocentric (IoM, 2007, 2011; Wyer et al., 2014)—created as part of the Roundtable on Evidence-Based Medicine, and another primarily ecocentric (IoM, 2013a)—focused on managerial and system changes healthcare leaders can do to improve performance. While both visions of LHS are positive steps, they don't deliver details on how learning will happen, and they dedicate only limited attention to social aspects of learning and QI. On the other hand, QIE and IPL are primarily social and learning endeavors. QIE/IPL requires a holistic approach to challenges that are contextual to a specific team, specific hospital, or specific patient; they require holocentric worldviews.

Gap. In short, we have a gap between the technocentric and ecocentric visions of LHS promoted by the Institute of Medicine and holocentric needs of IPL and QIE.

One physician leader corroborated that thought by explaining that since 1970es U.S. healthcare has been in a technocentric mode with isolated attempts to include ecocentric approaches:

> *Keep in mind that U.S. healthcare has been "driven" for the last 50 years by science and technology. "Quality" has essentially been defined as "do more," and outcome measured by the opinion of physicians, not measurable outcomes. Physicians have only begrudgingly accepted IPL in any form, so it*

> *should not be surprising that the focus has avoided more qualitative domains.*

Technical, managerial, and system design aspects of LHS have been elaborated by the IoM. Yet, for successful implementation of QIE/IPL and LHS, we need to better support knowledge creation as a social process. As Hardwig (1991, p. 697) explained: "*We need an epistemological analysis of research teams, for knowledge of many things is possible only through teamwork. Knowing, then, is often not a privileged psychological state. If it is a privileged state at all, it is a privileged social state. So, we need an epistemological analysis of the social structure that makes the members of some teams knowers while the members of others are not*." Therefore, for the success of perioperative teams we need to create a holocentric vision of LHS. Since it is a complex, social process significantly shaped by our ontological, epistemological, and axiological positions, following thoughts of van Baalen, Carusi, et al. (2017), I'll propose that philosophers and social scientist should have a more prominent role in that process.

Next section showcases an area where philosophers and social scientists can make such a contribution.

5.5 COMPLEXITY, AND A MECHANISM SHAPING THAT COMPLEXITY

How often have I said to you that when you have eliminated the impossible, whatever remains, however improbable, must be the truth? (Sherlock Holmes - Doyle, 1900, p. 68)

While I was doing TA and crafting answers, a few unanswerable questions popped up. That suggested—there is gap between the world I know and reality. There is a hidden mechanism I'm not aware of that is shaping the reality. As mentioned before, research informed by critical realism looks to describe the underlying mechanism that is shaping the reality. Therefore, in this section I will put on my critical realism hat and ask: "*What must the world be like for this to occur or to be intelligible?*" (Mingers, 2004, p. 8)

This is the gap I'm trying to explain:

- There are strong variations in QIE, IPL, and TEL perceptions. Those variations are filled with major contradictions between various elements inside each phenomenon and between various phenomena inside the LHS. As a result of numerous contradictions, the system seems to be highly complex. In many situations it looks chaotic. Despite that chaos and numerous contradictions, participants agree about the direction of the process: QIE, IPL, and TEL are part of our future.
- Why is history of QIE and IPL marked with a wealth of push-backs and chaos?
- Phenomenographic assumptions about hierarchies of perceptions and limited number of perceptions can't be achieved in this context.

I use the abduction and retroduction logical processes (Figure 49) to create theory explaining those findings. As the first step I take (abduct) the available data, re-describe and recontextualize it so causations, patterns, and regularities of events are more noticeable (O'Mahoney & Vincent, 2014). That exposes the gap between what we know and can explain with existing theories and what the findings show. A big part of abduction is done through TA and in this chapter so far. Now, as a second step, that gap will be addressed through retroduction. Retroduction is a creative process of observing patterns and asking: *What is the best way to explain it; what if?* At the end the data will be returned back (retroduced) through theory that explains how the causal mechanism behind that phenomenon works (Bhaskar, 2014).

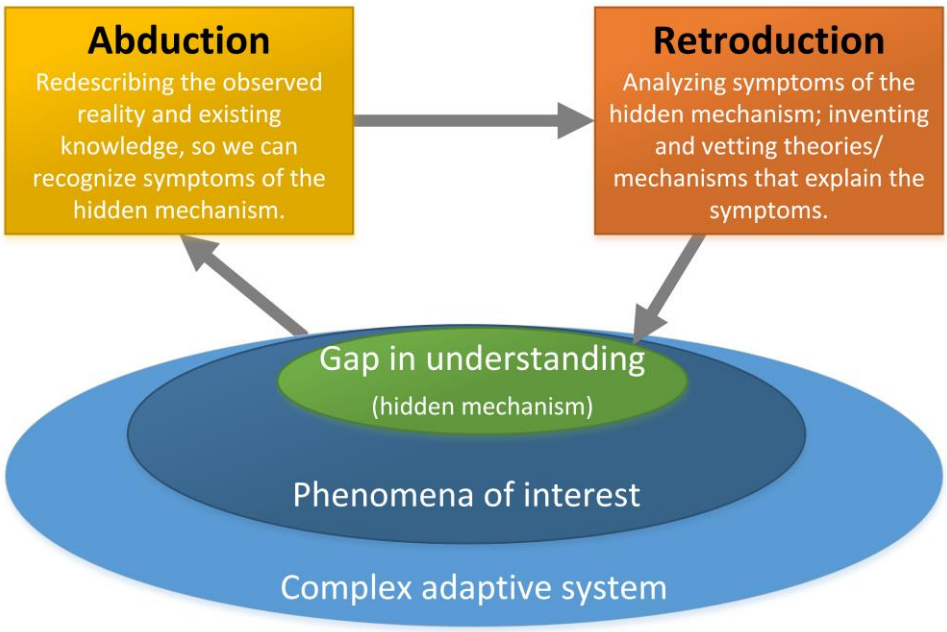


Figure 49. Abduction and retroduction as tools to explain the mechanism behind phenomena in complex reality.

Testing the theory. After the theory is created through abduction and retroduction, it should be tested through a series of deductions and inductions. Figure 50 illustrates that process. Critical realist theory should address all three levels of reality: empirical, actual, and real (Wuisman, 2005) and provide rich descriptions on what, where (which layer of reality), and why it is happening.

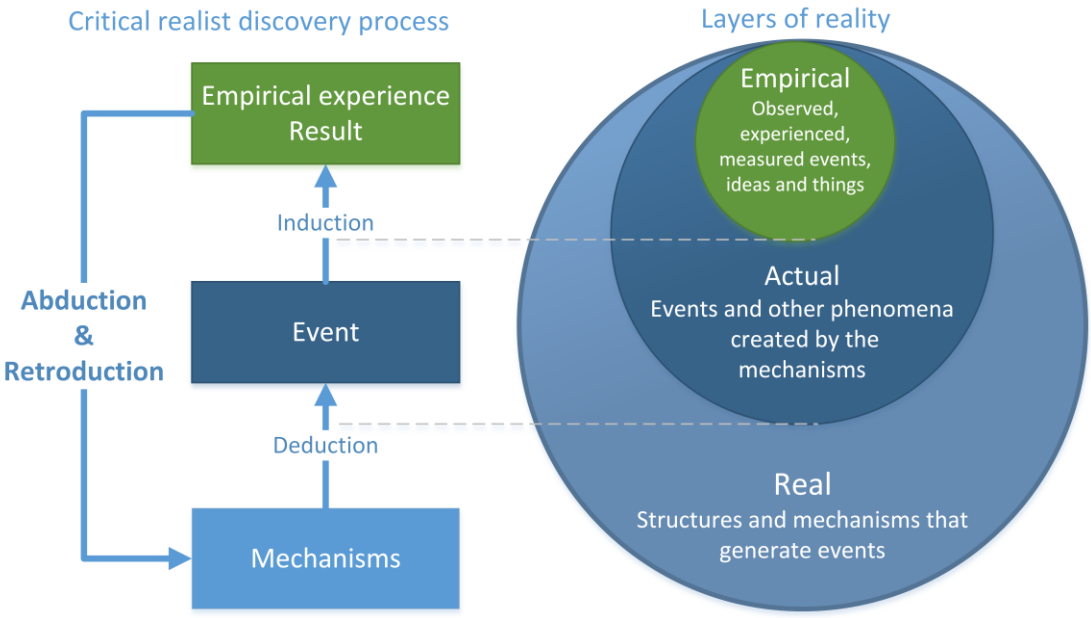


Figure 50. Process and location of abduction in relation to critical realist ontology (Adapted from: Wuisman, 2005. Used with permissin).

5.5.1 What if? And the result of that process

The theory creation was a long, messy, iterative process of abductions, retroductions, and many "what if" questions. Now when the theory is created, I can present it in a much more streamlined manner. Therefore, I will present the mechanism. Then I will provide examples of the same mechanism in different contexts, showcasing that the described mechanism is widespread. Finally, I'll reflect on how the mechanism impacts perioperative teams.

About the complex reality. All biological and social systems are open complex adaptive systems. Systems are nested. Therefore the biological and social world can be perceived as nested complex adaptive systems (Begun, Zimmerman, & Dooley, 2003; Keshavarz, Nutbeam, Rowling, & Khavarpour, 2010; Kitson et al., 2017). On each level of that nesting hierarchy features of an open complex adaptive system are noticeable. For example, a cell is an open adaptive subsystem in a clinician. In that relationship the clinician is supra-system. Yet, the same clinician is a subsystem in the perioperative team, the perioperative team is a subsystem in the hospital, the hospital is a subsystem in national healthcare, and healthcare is a subsystem of our society. On all those levels, systems act as complex adaptive systems.

Complex adaptive systems—are learning systems (Bleakley & Cleland, 2015). Complex adaptive systems adapt to changes in environment. Adaptation is, Keshavarz et al. (2010) explain, the sole certain feature of complex adaptive systems. If complex adaptive systems don't adapt/learn, they will be outpaced by systems that adapt/learn better. Learning at its core is adaptation (De Houwer, Barnes-Holmes, & Moors, 2013); it is a change by which a complex adaptive system becomes better-suited to its environment.

Therefore, the world can be perceived as an agglomeration of nested learning systems. Different learning powers and needs emerge on each level of that nesting hierarchy. For example, a learning system on the level of a clinician has different powers and needs than a learning system on the level of a perioperative team or national healthcare system.

5.5.2 The mechanism

Short description of the mechanism that is shaping learning systems is: The worldview matrix presented by Bawden (2010) is a dynamic cyclical process shaping at different speeds, learning systems located in all levels of our biological and social reality. Variation of statuses and various interactions of systems that are in different states contribute to the high complexity of our society.

The theory extends Bawden (2010) model by explaining the nature and direction of the process, and by providing examples of the process on multiple levels of our complex, nested reality.

In more detail: Nested learning systems located in all levels of our reality evolve through four stages. The process starts with an egocentric stage. Focus is only on things of immediate importance for the group (reductionism) and the world is perceived through their subjective lens (relativism). That is our default stage, and that stage can persist for a long time. When technology, for example the steam engine or writing is invented, our focus shifts toward technology. Our focus will be on how technology can address our immediate needs (reductionism). However, the shared, measurable, and therefore objective nature of technology will push us from relativist to objectivist mindset. As we are using the technology, the technology will start changing how our society works. Instead of addressing needs of a small group, it will start impacting everybody. Therefore, reductionist worldview will be replaced with holistic worldview. With that we will enter an ecocentric stage. Finally, the highest stage in this cycle, holocentric, will be built on stability, knowledge, and wealth created by an ecocentric system. In that system, citizens have resources for education, time to reflect, and understand other people's' perspectives; they are protected by a strong safety net and supported by a wealth of cultural artefacts.

The mechanism can be recognized in our biological and social evolution, our personal development in society, and even Kolb's experiential learning cycle (Kolb, 1984) can be presented as this mechanism. Perioperative clinicians are affected with the same cycle on at least five levels: individual clinician, perioperative team, healthcare organization, professional organizations, and national healthcare system.

Figure 51 illustrates the mechanism.

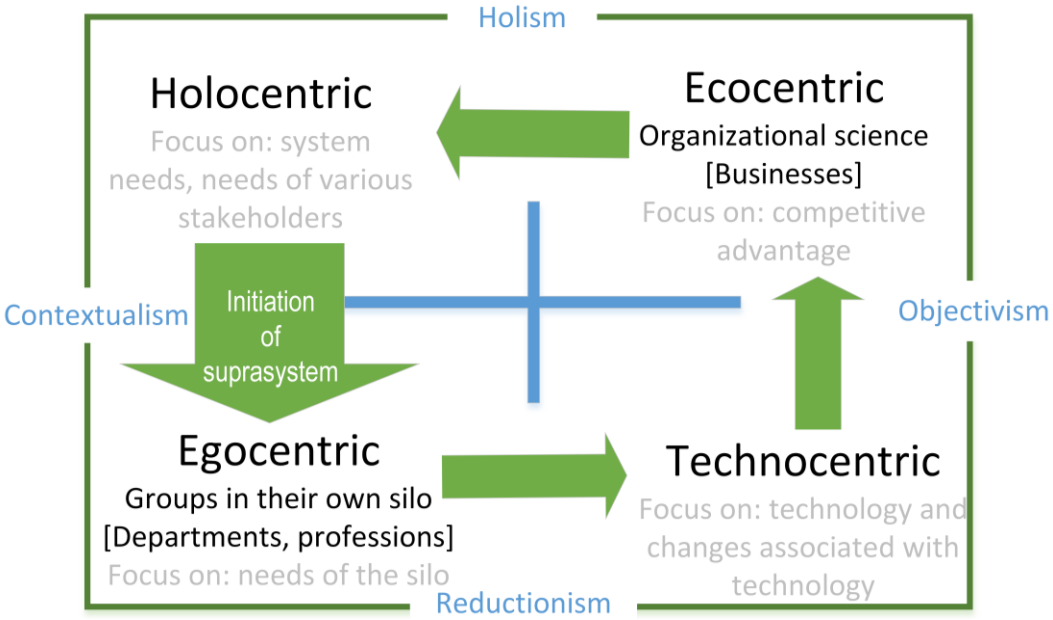


Figure 51. Mechanism of learning system evolution (Adapted from: Bawden, 2010).

5.6 EXAMPLES OF THE MECHANISM

Let me provide examples of the mechanism in these three contexts: biological and social evolution, Kolb's experiential learning, and development of a person. That is deductive logic described in Figure 50. After that I will reflect on how it affects perioperative clinicians. That will be an example of inductive logic.

5.6.1 Biological and social evolution

Evolution has been in charge of selecting the most adaptable forms of life. All forms of life are self-producing, self-maintaining adaptive systems (Damiano & Luisi, 2010). Whether we are talking about unicellular or multicellular organisms, groups, populations, species, or civilization, evolutionary selection is forcing them to act as learning systems. They must be constantly increasing their capacity to learn and shape their future. That in many ways matches the classical definition of a learning organization as a system "*that is continually expanding its capacity to create its future*" Senge (2006, p. 14). If they don't learn and improve well enough and fast enough, other organisms, groups, populations, cultures, or species will outperform them. Archeological fields expose almost endless evidence of species, cultures, and civilizations that are gone forever. It is not that they were not learning systems, it is that at one point they didn't learn as well and as fast as their competition. Therefore, just like in the competitive, ever-changing economy "*all organizations are learning systems*" (Nevis, DiBella, & Gould, 2000, p. 3), all cultures (visible characteristics of groups like perioperative teams) and all phenotypes (visible characteristics of individuals) act as learning systems.

Evolution of learning systems. Evolution thus far has gone through at least eight major transitions (Smith & Szathmary, 1997; S. A. West, Fisher, Gardner, & Kiers, 2015). In each of those transitions (Table 7) smaller entities organized themselves and created a bigger entity; they would specialize, divide labor and lose possibility to productively live and replicate in the absence of the bigger entity. Each transition involved transformative "*changes in the way information is stored and transmitted*" (Szathmáry & Smith, 1995, p. 227). In other words, it involves new technology and subsequent transformation of a learning system in use.

Starting level		Destination level
Replicating molecules	→	"Populations" of molecules in compartments
Independent replicators	→	Chromosomes
RNA as both genes and enzymes	→	DNA as genetic code; proteins as enzymes
Prokaryotes	→	Eukaryotes
Asexual clones	→	Sexual populations
Protists	→	Multicellular organisms—animals, plants, fungi
Solitary individuals	→	Colonies (with non-reproductive castes)
Primate societies	→	Human societies with language as an important technology

Table 7. Major transitions in evolution
(Source: Smith & Szathmary, 1997, p. 6. Used with permission).

The major transitions in evolution (Smith & Szathmary, 1997) progress through all four phases of Bawden's matrix (2010) during each cycle. For example, four stages marked evolutionary transition from unicellular to multicellular organisms:

- **Egocentric**. Life started as unicellular organism where each cell had only purpose to address its own interest (egocentric).
- **Technocentric**. In the next, technocentric stage cells figured that as a group—for example a colony—they could perform better. A colony is technology numerous species used prior to adopting simple and later complex multicellularity (A. H. Knoll, 2011)—more advanced technologies.
- **Ecocentric**. In complex multicellularity, cells are proficient in using advanced communication tools. They exhibit altruism and specialization. They trade their individual fitness for survival to fitness of the group. With that individuality has been transferred from unicellular to multicellular life (Michod, 2007; S. A. West et al., 2015). That is the ecocentric stage.
- **Holocentric**. Finally, multicellular life evolved into a complex system that takes a holocentric approach. For example, the human body is a complex system, where each cell serves the purpose of the system (holism), and the system respects various, contextual needs of different cells.

The logic between cycles is that when a system achieves holocentric modality, it can become an element of a bigger egocentric system. With that evolution process is transferred to the suprasystem. The suprasystem uses new technology to connect elements of the subsystem. Figure 52 illustrates the process on a large scale.

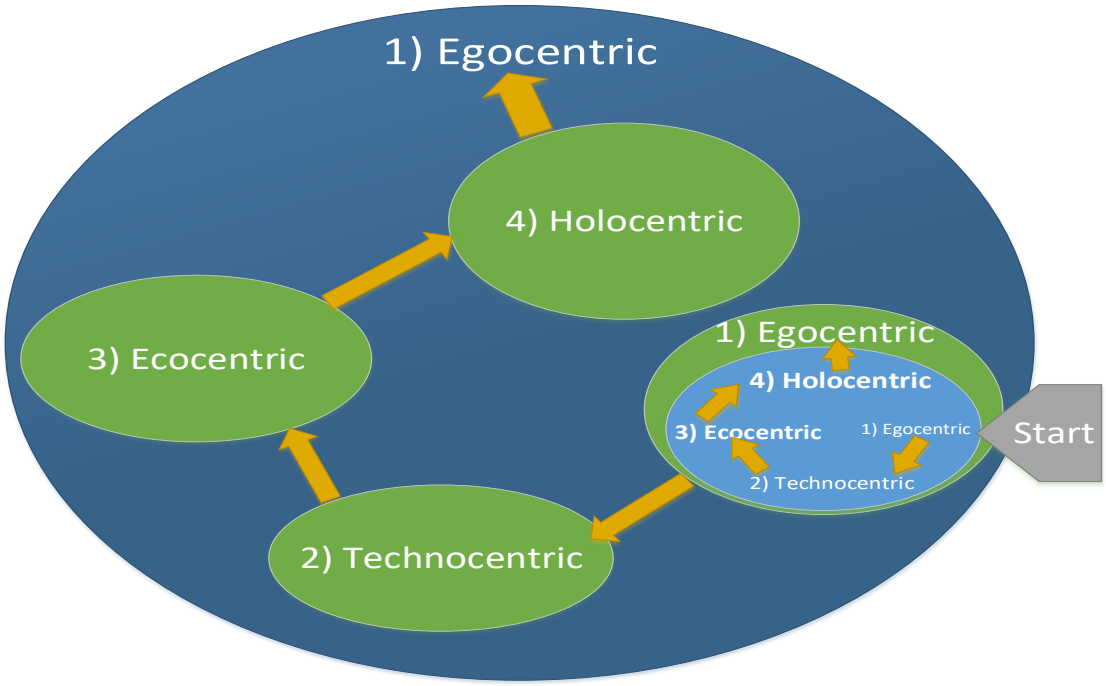


Figure 52. Two cycles of evolutionary transition
As a small system becomes holocentric, it can start acting as a building block in egocentric system.

Learning system dynamics on this level can be used to analyze the formation of systems—like perioperative teams, and interaction between supra- and subsystems.

For example, when an interviewee described transformation of primal identity where *"Instead of, 'I'm an anesthesiologist,' or, 'I'm a nurse anesthetist,' it's, 'I'm a member of the joint replacement team.'"*—that was the transformation from egocentric (I'm my profession) or technocentric (I'm my expertise) mindset toward ecocentric mindset (I'm member of the team).

5.6.2 Bawden mindsets and Kolb's experiential learning cycle

Kolb's experiential learning cycle shows the same pattern (Figure 53):

1. **Egocentric—Abstract Conceptualization**. The first phase of the experiential learning cycle is focused on a new concept. Learner is building that new concept in the context of her knowledge and belief system. Therefore, the learner is influenced by contextualism. Since learner is trying to grasp basic elements of the new concept, she is taking a reductionistic approach.
2. **Technocentric—Active Experimentation**. During the active experimentation phase, learner tests the new knowledge in the big shared (therefore objective) world. Focus is on the application of the new concept. Application of new "*knowledge to the practical aims*," is exactly how Britannica (2018) defines technology. Therefore, this phase is technocentric.

3. **Ecocentric—Concrete Experience**. After the learner has become aware that the concept works in the big objective world, instead of focusing on the concept, she takes a more holistic stance and assesses how she can use the concept to improve the world.
4. **Holocentric—Reflective Observation**. Finally, after the concrete experience with the new concept, the learner can reflect and consider how the concept can provide additional benefits, or benefit additional groups, how she can teach others to use the same concept. Therefore, she can think holistically and contextually.

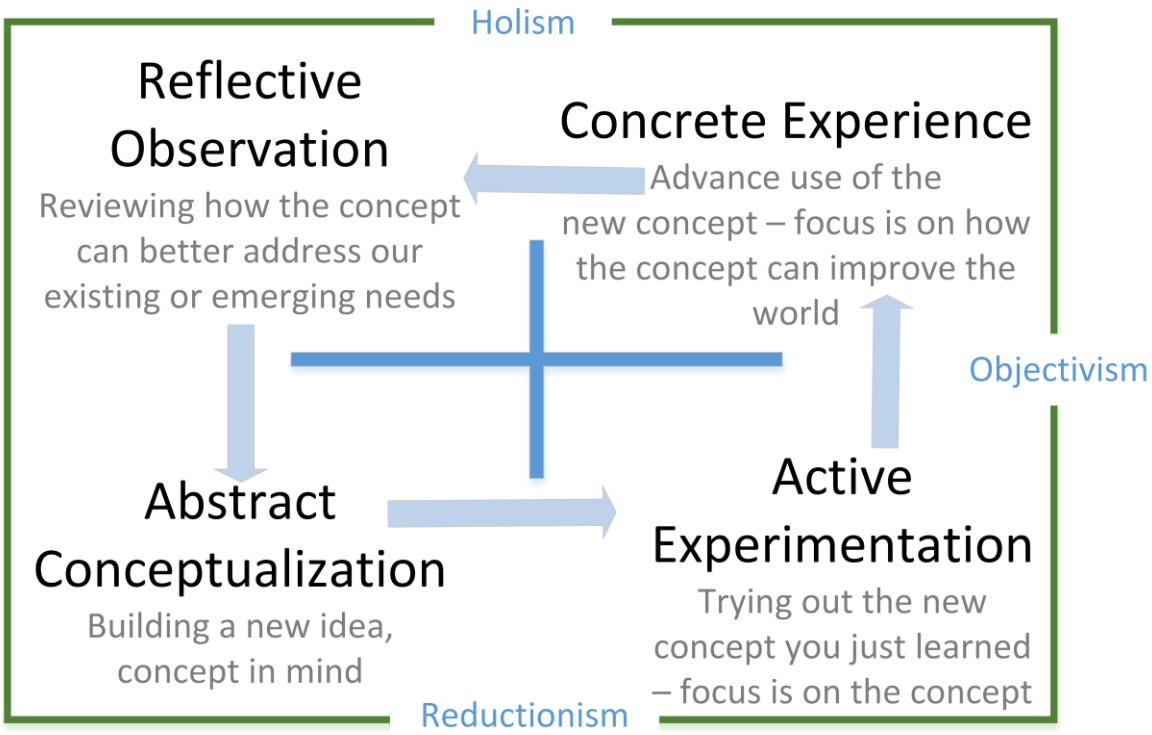


Figure 53. Kolb's experiential learning system presented through lens of Bawden's learning system dynamic.

Learning system dynamics on this level can be used to analyze decision-making and the learning process in perioperative context.

5.6.3 Development of person

Personal development throughout a lifetime follows the same path (Figure 54). Erikson and Erikson (1998) provided one of the most comprehensive and quoted descriptions of how personal traits evolve. During pre-school, kids are building trust toward the world around them. While their radius of significant relationships is moving from maternal person toward basic family, their autonomy is limited, and they act very egocentrically. For example, young kids can't cognitively take in that the perspective of another person exists. They believe that everybody sees what they see. During the school years, they are in their technocentric phase. Their task is to learn technology (text, language, IT) to communicate with the world, and world technological order. Adolescence is a turbulent time. As teenagers are gaining more power to act in the big world, they must accept ideologies needed to comprehend complexity of that world. That is the beginning of the ecocentric phase. Participants have an active role in the big picture, yet they are focused on achieving objective, expected outcomes like career, family, and further education. Finally, during our older age we have enough wisdom to understand various perceptions and take more holistic approach.

As adults, our egocentric nature is not gone. We as individuals and groups see the world with our own eyes. Therefore "ego" is our first frame of reference, our center. However, as adults we have mental models, tools/technologies, and responsibility to build on the egocentric view and move into other quadrants.

On the other side, there are situations that move us back to our egocentric base. For example, as we age and our health and possibility to contribute to the society deteriorate, the egocentric trait can become more obvious again (Looft, 1972; Riva, Triscoli, Lamm, Carnaghi, & Silani, 2016). Stress can have a similar impact on our behavior. During a stressful situation our learning shifts from reflective/cognitive to reflexive/habitual models, significantly reducing our ability to reflect and strategically respond to changes in the context, and ultimately putting us in egocentric mode (Wirz, Bogdanov, & Schwabe, 2018).

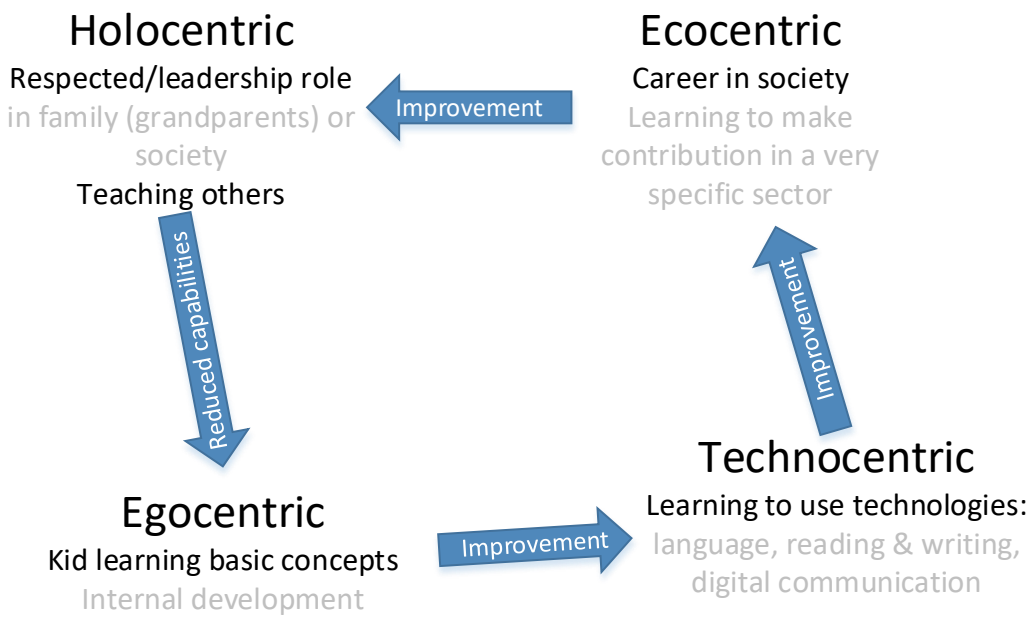


Figure 54. Development of a person—evolution of dominant worldviews.

Learning system dynamics on this level can be used to analyze progress of perioperative professionals through career (from technocentric student to ecocentric and holocentric senior members of the team).

The presented examples of the same process happening in three significantly different contexts (bio-social evolution of life, Kolb's experiential learning, and development of a person) suggest that this is an omnipresent mechanism. The more I think about it, the more I see it in every aspect of our life. Yet various alternative mechanisms can activate and deactivate or interfere with the mechanism, or the system can deteriorate. Therefore, we may have examples where the mechanism is not active or recognizable. The American healthcare debate is an example of contradictions between this and at least one more mechanism. Contradiction created through that interaction affects all subsystems—including perioperative teams.

5.6.4 Sick-care vs. Health-care business model

The evolutionary lens provides valuable insight on evolution—or lack of evolution—of the U.S. healthcare systems. As discussed in the Literature Review, U.S. healthcare is in a state of constant turmoil and political debate. That is not surprising. Despite being the most expensive healthcare system worldwide, on system level, it does not perform better than the healthcare systems of many other developed countries (Papanicolas, Woskie, & Jha, 2018; Schneider et al., 2017). What can we learn from the evolutionary theory about the U.S. healthcare political dynamics?

Bawden's (2010) normative view window (image below) can help us to connect the ontological and epistemological positions with normative and value positions that shape our

politics. Due to complex, very dynamic and variable nature of our ontological, epistemological, axiological, and political positions (on individual and group levels), we can't expect absolute overlap (Bawden, 2010). However, it's fair to say that on a population level that overlap—as presented on Figure 55—exists (Kusch, 2004; Riches, 2000; Tucker, 2014).

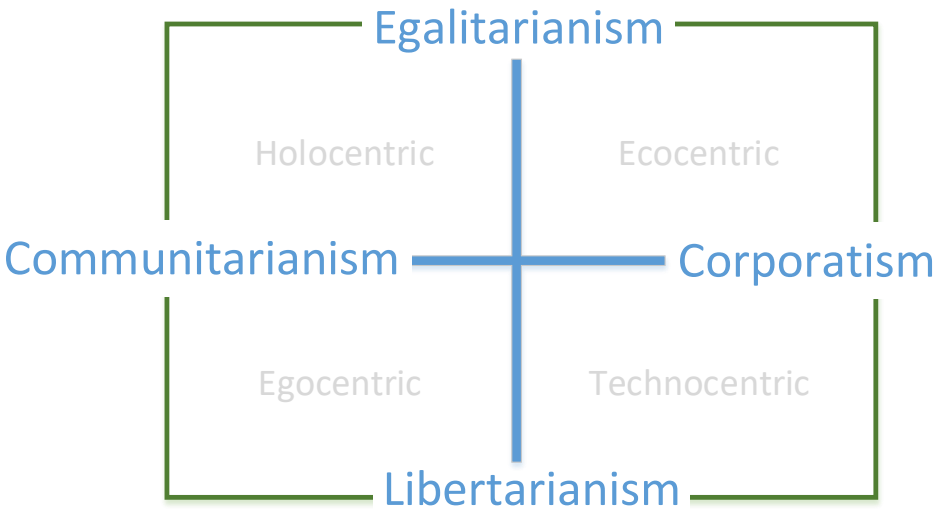


Figure 55. Normative view window
(adapted from: Bawden, 2010, used with permission).

Evolution of healthcare systems. In all high-income countries, except the U.S., the healthcare system has evolved to some form of universal healthcare (Papanicolas et al., 2018). That is primarily an egalitarian/holistic worldview that attempts to treat all citizens equally. The ratio of communitarianistic/contextualistic vs. corporatistic/objectivistic elements varies depending on the task (for example preventive care vs. complicated elective surgery), and location (big hospital vs. small medical practice). Since everybody is insured, the system is focused on maintaining the optimal healthcare status of the nation while keeping costs low. It is a continuous process, therefore universal healthcare is often described as a journey, rather than a static location (WHO, 2015).

In the U.S., due to strong libertarian and neo-liberal worldviews, the healthcare system was not able to evolve into the egalitarian—universal healthcare status (Finkel, 2015). As House Speaker Paul Ryan (2017) explained, Republicans "*want all the providers of healthcare services, insurers, doctors, hospitals, everyone, competing against each other for our business as patients, as consumers*." That is a description of an egocentric world where business profit, fight for individual interests, and focus on acute sick-care are the dominant forces. It is a sick-care business model.

Sick-care business model in many ways mimics the logic of other industries. In order to grow, business needs more customers—that are using their services more and more. Levitt (1960, p. 43) explained that a successful organization or successful industry "*must be viewed as a customer-creating and customer-satisfying organism. …It must learn to think of itself not as*

producing goods or services but as buying customers, as doing the things that will make people want to do business with it." Therefore, investment in preventive medicine is minimized and focus is put on expensive acute care. Furthermore, the competitive, profit-driven nature of the endeavor discourages healthcare organizations to share data. For example, while U.S. government is investing significant efforts to encourage hospitals to participate in healthcare data exchanges, for-profit hospitals and hospitals in competitive markets are reluctant to join such exchanges (Adler-Milstein & Jha, 2014).

Healthcare is a significantly different model. Many healthcare concepts are opposite from the traditional business model sick-care uses. Healthcare has a goal to make people and communities healthy. Since healthy communities have reduced need for medical services, the indirect goal of healthcare is to reduce the time the community will use medical services (Maccoby, Norman, Norman, & Margolies, 2013). On the other hand, more investment is put on programs that empower individuals and communities to nurture their health, prevent illnesses, and increase the quality of life.

Figure 56 illustrates that difference.

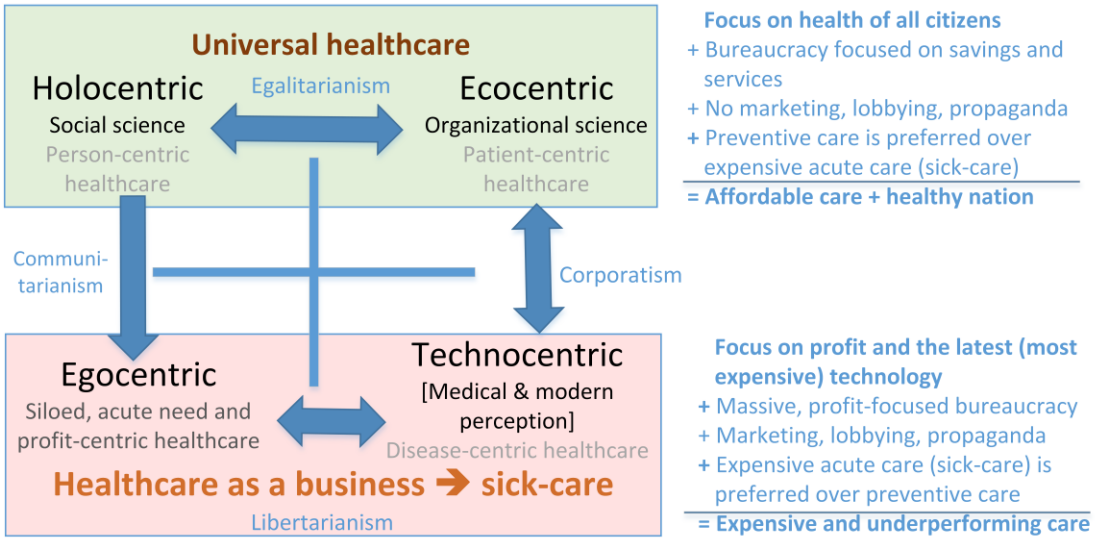


Figure 56. Egalitarian vs. libertarian worldviews on healthcare.

While on a local level we plan implementation of ecocentric and holocentric modalities as perioperative-surgical-home and value-based-care, it is important to reflect on how worldviews and practices harnessed at the level of the national healthcare system and promoted through vigorous political campaigns impact that process.

5.7 IMPLICATIONS OF THE LEARNING SYSTEMS EVOLUTION THEORY

The learning systems evolution theory describes one mechanism that shapes changes in probably all layers of our reality made of nested complex adaptive learning systems. Yet it is fair to assume than in each system and subsystem of our complex world, the mechanism evolves at a unique speed and interacts with the context and other mechanisms, creating very variable outcomes. The mechanism is part of a constantly evolving complex mosaic. Therefore, instead or using it to predict trends, it may be more worthwhile to use it to help understand the trends. It is like with dance (Meadows, 2002); it is hardly possible to predict how an unknown independent dancer will dance. However, if we dance with somebody, we can feel what the next move will be, and we can guide that move. We can feel the rhythm.

As part of retroduction, I used examples of biological and social evolution, Kolb's experiential learning, the development of a person, and examples of the evolution of healthcare systems. While I use those examples to prove the mechanism, now I can use such mechanism to better understand the systems. Therefore, the examples presented during retroduction are also cases of implications of the theory.

Three additional generalizable implications presented as patterns that this mechanism can help us better understand are as follows:

- Acceptance of TEL by educators and healthcare professionals
- Interaction between payment mechanisms and learning on a local level
- Postdigital science and education planning

In the following paragraphs, I will present the generalizable implications, and in the last few paragraphs of this chapter, I will focus on implications specific to the perioperative context.

Acceptance of TEL by educators and healthcare professionals

The reluctance of education to adopt technology has been well described during last 30 years (Escueta, Quan, Nickow, & Oreopoulos, 2017; Kop, 2008; McMeen, 1986). It was common to read about students who are out of the classroom and live in the digital world, and who, while in the classroom, are pushed back in what was possible in 1980 (Prensky, 2005). While the initial attempt to attribute this to generational issues has been debunked (Bullen, Morgan, & Qayyum, 2011), the nature of the contradiction is still perplexing: the system designed to generate the transformation of individuals and society is rejecting the transformation. The explanation this theory proposes is as follows:

The educational system, as a system with the goal to transform profound complexity of individuals, teams, and communities, has many features of the holocentric system. Holocentric features are essential for proper performance of the system. The mechanism explains that new technologies push systems from established holocentric into egocentric,

technocentric, and eventually ecocentric modalities. Since the holocentricity of the educational system is essential, many educators will reject leaving the heliocentricity of the old system if the potential holocentricity of the new system is not well defined. In those cases, technocentric and egocentric phases are not perceived as paths to get to better holocentricity but as something that will diminish the current holocentricity.

Parallel with many examples of resistance toward TEL, we see many very successful examples of innovative TEL implementation.

What is the difference?

Vision of new, better holocentric system vs. fear of technocentric bureaucracy. The mechanism helps us recognize that institutions that successfully use TEL have a well-planned, systematic approach to technology implementation. Through small iterative cycles of the learning system evolution, they have been continuously implementing new technologies—and using those technologies to initiate ecocentric and holocentric modalities. The key is that each cycle was short enough and/or planned well enough that participants recognized technology as a tool to create better heliocentricity—instead of being a tool that destroys the current heliocentricity and builds an egocentric or technocentric system. The mechanism provides a new perspective to an already described phenomenon. While implementing technology, we need a well-developed vision that describes how the technology will help us reach new ecocentric and holocentric levels. For example, Bates (2000, p. 50) explained:

> *A plan will be only as good as the vision that drives it. In my visits to universities, I saw not lack of commitment by senior management to investing in technology for teaching… What often is lacking is strategic vision, that is, how technology can be used to change the way a university or college does it core activities and business to that it can reach out to new needs or new target groups.*

In the other words, management is usually eager to invest in technologies. From their perspective, technocentric and holocentric modalities work well. They are objective, measurable, and predictable. Yet educators recognize that technocentric or holocentric modalities are not well positioned to address the complexity of learning.

Therefore, if we do not have a well-planned and well-communicated strategic vision of how to use the technology to achieve ecocentric and holocentric modalities, there is a risk that we will stay stuck in limbo between old holocentricity, a lone-ranger implementation of technology (egocentric phase), and the technocentric stage. Educators will feel that risk and they will resist the change, further reducing the possibility of successful TEL implementation.

Healthcare, like education, has many holocentric features. Therefore, the interaction between healthcare professionals and new technology can mimic the described interaction between educators and technology.

Ultimately, while implementing the TEL of perioperative professionals, especially one that focuses on QIE and IPL, we have to plan and communicate the path to heliocentricity in two domains: education and healthcare delivery.

Interaction between payment models and learning on the local and clinical team level

Payment models define how employees and other stakeholders are rewarded for their work. Therefore, they are one of the central characteristics of the business model in use. Changes in payment models are one of the main drivers of the expected transformation of U.S. healthcare. The mechanism can help us observe payment models as examples of learning systems that promote different types of learning on the perioperative team level. The traditional fee-for-service model in its essence is an egocentric model where each healthcare unit operates in their own silo and communication is primary of financial nature: the more service you provide, the more fee you can charge. Since that model neither tracks the quality of services provided nor provides feedback and encouragement for clinicians to do quality improvement, there is the initiative to replace the fee-for-service model with models that are more focused on quality improvement.

Pay-for-performance and value-based care are the main quality improvement–related payment models. These models have a significant impact on how perioperative teams work, how they are rewarded for their work, how they practice QI, and, secondary to that, how they practice TEL. The Medicare Access and CHIP Reauthorization Act of 2015 (MACRA) is one of the major legislative changes that have been reshaping how healthcare is delivered and rewarded (CMS, 2017; U.S. Congress, 2015). The goal is to improve the quality of care delivered while reducing costs.

Confusion. A significant number of clinicians support the intention behind MACRA. However, complexity and associated unpredictability of law implementation and possible conceptual errors make them confused, puzzled, or, as Tempero (2017, p. 137) describes, “Mad about MACRA.”

The learning system evolution theory sheds additional light on the transformative processes on the national and local level and the interaction between those systems. In its essence, we have two approaches: pay-for-performance and value-based care (Porter, 2016). The image below illustrates the difference between those approaches on the example of the perioperative surgical home.

Pay-for-performance is a model dominantly built around rewarding easy-to-measure behaviors of individual clinicians and easy-to-measure healthcare outcomes (Berenson & Rice, 2016; Erdek, 2018). While the simplicity of such a model is very attractive, the wealth of data shows that for ambiguous and complex activities (healthcare quality improvement and healthcare delivery fit that category), the impact of pay-for-performance is limited and very often negative (Osterloh, 2017). Observed though the lens of the evolution of the learning system mechanism, we can see that pay-for-performance acts as a technocentric model on a national-payer level promoting technocentric activities on local clinical level. Technology in that system is used primary to enhance communication between individual siloes and quality improvement and payment authorities while communication between siloes is of secondary importance (Porter, 2016; Porter, Larsson, & Lee, 2016; Porter & Lee, 2013a, 2013b). For example, surgeon and anesthesiologists can have completely separate quality improvement and payment mechanisms.

Value-based care, on the other hand, consists of initiatives that reward outcomes important for patients—and achieved primary through well-coordinated team-based care (Porter et al., 2016; Porter & Lee, 2013b). Outcomes important for patients are: health status achieved, sustainability of health, and quality of care cycle and recovery (Porter & Lee, 2013a). As such, value-based care acts ecocentrically on a national level while promoting ecocentric and holocentric activities on the local, team-based level. Technology used to support value-based care enhances communication between all teams involved in patient care, as well as patients and their families.

This model can help us understand why, while being widely used and popular, it is very debatable whether pay-for-performance programs are effective (Eijkenaar, 2013; Milstein & Schreyoegg, 2016). It provides insight into quite significant differences between these two models. It can also help us better understand the complexity of value-based care and how we can use TEL to improve it.

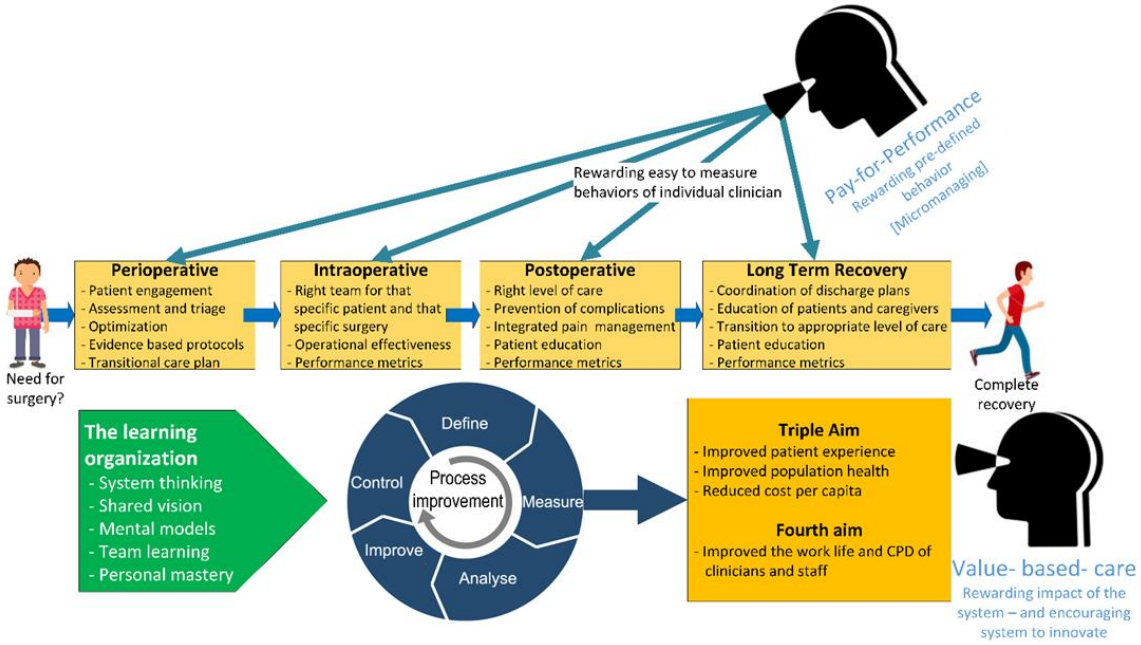


Figure 57 Pay-for-performance vs. value-based care

Planning postdigital science and education and perioperative care in the postdigital context

Evolution to postdigital phase. As we are living in a time when digital technologies have become as natural as writing and speaking, we are entering the holocentric phase of digital technology. It is the phase where we will notice the technology only when it is missing or when it is broken or contaminated. It is the postdigital age when digital information and communication technology lose their techno-positivism (technocentric phase) and improvement and innovation karma (ecocentric phase) and become part of the established technologies we have available to everybody all the time (Cramer, 2015). The mechanism provides insight into the path of how we evolve to the postdigital phase and what is happening after, and how our interaction with digital technologies is changing (Jandrić et al., 2018). Obviously, digital technology is a broad term with many subtechnologies and trends, and each of those subtechnologies can have different evolutionary paths in different contexts. Therefore, we cannot use this mechanism as a tool for long-term prediction but as a tool that will improve our skill in recognizing the beat and dancing with changes specific to each context and each technology.

Dancing with postdigital workforce. That "dancing" skill will be very helpful. In the perioperative TEL context, we can expect a wealth of changes, challenges, and opportunities related to postdigital transformation. Strong technology-enhanced QI and learning frameworks are already in place, and in a few years, the majority of healthcare workforce will be made of millennials (born between 1981 and 1996) and generation Z (born after 1997). Millennials, many of them avid users of communication and learning technology, have become the biggest group of healthcare professionals, and generation Z, who are avid users

of social media and mobile technology, are starting medical schools (Boysen, Daste, & Northern, 2016). In other words, as we are planning the implementation of QIE and IPL, the technology and the majority of workforce are ready for the postdigital world. Therefore, we should reflect on the increasingly postdigital nature of our world, and in addition to the use of digital technology to enhance our current practices, we should consider using older technologies to enhance a digital technology–rich world.

Postdigital perioperative care. This thesis studies the use of technology to enhance the learning and practice of perioperative teams—especially teams that adopt concepts of the perioperative surgical home (PSH) or its "older brother"—the enhanced recovery after surgery (ERAS) model. Yet, as Dr. Olle Ljungqvist, one of the initiators of ERAS and a known ERAS leader worldwide, noted (Ljungqvist, 2017), "ERAS is human to human link that secured that technology is not pushing us apart," and "The next revolution in surgery is gonna be based on something that has been with us all the time—talking to each other." The revolution Ljungqvist describes will happen in a postdigital, technology-rich world, where we use old and new technologies to empower individuals, teams, and the society to act in a holocentric manner.

5.7.1 The mechanism and perioperative teams

Perioperative perspective. In the previous section, I presented generalizable examples of the learning system evolution theory implications that are important for perioperative care. In this section, I'll analyze the mechanism from the perspective of perioperative teams.

This mechanism explains changes affecting various learning systems that perioperative clinicians participate in—including QIE, IPL, and TEL. I gave examples of how it affects decision-making (Kolb's experiential cycle), the career development of clinicians, and the interaction between systems on various levels. I used the mechanism to explain cycles of TEL adoption and payment models that national learning systems use to promote specific types of learning on the local level, and I explained how the mechanism can provide a new view of perioperative care in a postdigital world.

Nested perioperative learning systems. The evolution of learning systems that affect perioperative care is happening in different aspects (for example, different professions, different organizations) and different levels (individual, team, organization, national healthcare system) of systems at different paces. Critical realism (p. 73) explains that between those levels, we can have a strong upward and downward causation.

From the perioperative team perspective, this means that learning (sub)systems that exist in multiple levels should be combined to optimize performance. We should consider learning what happens on each level of each professional, and their interaction with their professions

and professional CPD institutions, as well as learning the (sub)system that exists on the team level (for example, PSH), institutional level, interinstitutional level, and national LHS level. In other words, learning solutions for perioperative teams should be planned from the perspective of nested perioperative learning systems.

Evolution of QIE, IPL, TEL, and PSH activity systems. Activity systems such as QIE, IPL, and PSH are open, complex, and adaptive. Therefore, they are also learning systems. Activity systems are "*minimal meaningful context for individual action*" and learning (Kuutti, 1996, p. 2323). Therefore, it is fair to assume that they go through the same evolution. For example, for IPL as a new concept, a new technology will initially put us in a technocentric phase, where we are focused on IPL as a new concept/technology. Enthusiasm from many interviewees suggested that IPL is in a technocentric phase. When IPL becomes part of our standard repertoire (holistic), with established standards (objective), it will be in the ecocentric phase. Finally, in the holocentric phase, we will have know-how and technology to combine the holistic approach to the contextual needs of each team and each learner.

QIE, IPL, TEL, and PSH vs. nostalgia for the past? The challenge with a new concept is leaving the stability of the subsystem. This very much mimic cycles of adoption described under the acceptance of TEL.

QIE, IPL, TEL, and PSH can be used as examples of comprehensive technologies we can use to improve the learning and performance of perioperative teams. For example, the idea of technology-enhanced interprofessional collaborative learning means that we have to leave our comfort zone of uniprofessional content-focused learning and undergo a technocentric phase before we reach an ecocentric or holocentric one. This is a complex sociotechnical process with many potential bumps in the road. Therefore, the strategy of reaching a holocentric mind-set has to be well-planned. Otherwise, there is a decent chance that, since we will not reach the holocentric level easily, we will be tempted to go to the (perceived) heliocentricity of the old system.
Furthermore, new technologies can cause stress and put us in a defensive, egocentric mode. As a result, we will reject technology or use technology only to enhance existing practice (Blin & Munro, 2008; O'Doherty et al., 2018).

I will wrap up this section with reflection on the QIE roadmap mentioned at page 52. That map had considerable influence on me when I started this thesis. Now I know that it can serve as a helpful map of the mechanism that is transforming our learning systems—as Figure 58 illustrates. The missing part was technology—so I added it. Technology is a critically important element of our society. Therefore, systematic changes like QIE and IPL have to take into account the technology we use and the worldviews we share. If we forget just one building

block of that mosaic, our plan may have big holes, and stability of the old system will be very tempting.

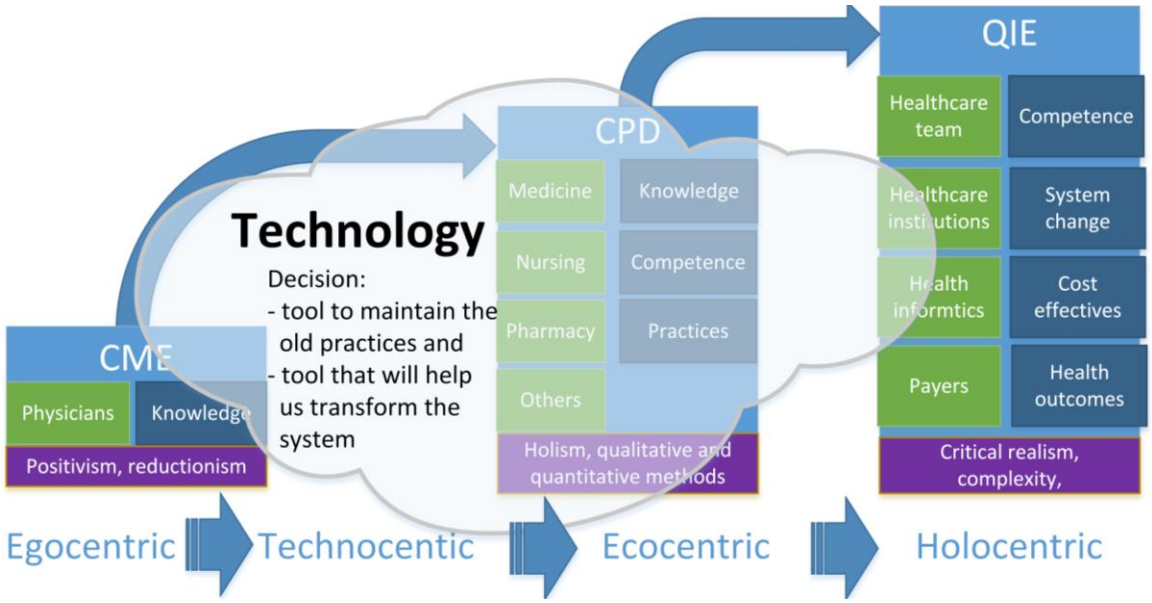


Figure 58. QIE map—mapping worldview transformations.

Dance with complexity. While there is not a clear answer how to best combine technocentric, ecocentric, or holocentric aspects of nested systems, insight into ontological and epistemological logic behind evolution of QIE and IPL as learning systems may help us maximize benefits of those systems. It will make the dance with complexity (Meadows, 2002) much more pleasurable.

5.8 THE MECHANISM AND PHENOMENOGRAPHY

As part of the gap between the world we know and the world that is presented in this research—a gap that has to be explained with this theory—I mentioned the inability to follow phenomenographic assumptions about hierarchies and the limited number of perceptions in this context. Therefore, I will finish this discussion by reflecting on phenomenography.

Phenomenography was an important part of my research path. I originally planned to use phenomenography instead of TA. In the Methodology chapter (p:79) I described how I spent considerable time attempting to use phenomenography. I'm fortunate I had that experience because the challenges I experienced with phenomenographic doctrines can confirm this theory, and the theory can shed additional light on the nature of phenomenography.

I hypothesized why there seems to be a mismatch between phenomenographic traditions and analysis of complex phenomena in a complex environment. Expectations that a limited number of distinctively different ways of understanding will form a hierarchy (Marton & Booth, 1997) may look like an attempt to deconstruct and simplify a complex systems. That

doesn't align well with complexity theory and perception of the social world as nested complex adaptive learning systems (Begun et al., 2003; Kitson et al., 2017).

After observing those challenges through the lens of the mechanism that drives evolution of a learning system, and critical realist ontology, I propose this explanation:

- Traditional phenomenography is focused on a variation of perceptions among quite a homogeneous population (usually students) in one stable and relatively closed learning system (usually a classroom or school). In such controlled environment, phenomenographers can describe a limited number of distinctively different ways of understanding that forms a hierarchy. In essence, that hierarchy is based on transformation from
  egocentric—to—technocentric—to—ecocentric—to—holocentric mindsets, or part of that transformation.

A few papers that were recommended to me as examples of good phenomenographic analysis (Ashwin, 2005; Cutajar, 2014) can serve as examples of this proposition. For example, Cutajar's analysis of network learning experiences displayed the full transformation of networked learning perceptions through all four worldviews:

- It provides easy access to resources they need (egocentric).
- It is technology that enhances self-managed learning (technocentric).
- It is connectivity with others and development of shared enterprise (ecocentric).
- It is learning in a harmonious learning community (holocentric).

On the other hand, perioperative clinicians work and learn in various, often evolving environments; and their background, culture, roles, and exposure to technology significantly vary. Above that, their perceptions are shaped by evolution of learning systems on national, professional, organizational, and team levels. Therefore, various and usually conflicting processes influence their perception. In such a context we can have an almost unlimited number of perceptions and those perception can't be easily grouped in simple hierarchical order.

5.9 IN SUM

In this chapter, I discussed the big picture of how QIE, IPL, and TEL are perceived in perioperative context, and how those perceptions interact. I reflected on how different worldviews that were described by interviewees impact perioperative teams. Lack of connection between perceptions of QIE, IPL, and TEL in a perioperative context and concept of LHS were explained and corroborated with four participants in follow-up interviews. Perioperative teams need holocentric vision or LHS, while current visions are painted primarily as technocentric and ecocentric endeavors.

Finally, I presented the mechanism that is guiding evolution of learning systems. Evolution of learning systems affects how perioperative clinicians perceive QIE and IPL on multiple levels—from individual and professional to group, organizational, and national levels.

Reality made of circles. We often experience challenges with understanding reality made of nested complex systems. Therefore we try to deconstruct complex concepts into simple models. Senge (2006, p. 73) explained that: "*The reality is made of circles, but we see straight lines*." We are trying to deconstruct complexity because it is hard to understand circles and how those circles interact. I hope this mechanism will help us better understand, better see, and better improve the reality made of circles.

With that I'm ready for the final chapter where I will reflect on the contributions to new knowledge I made, limitations that should be considered while evaluating this study, and possibility for future research. In conclusion I will reflect on how this research endeavor helped me grow, and challenges I experienced during that process.

6 VALUATION OF THE RESEARCH

6.1 INTRODUCTION

In this study, my goal was to research how the U.S. perioperative teams and their CPD providers perceive QIE, IPL, and TEL as well their interrelationships, and reflect on how the findings impact perioperative teams.

Massive changes affecting healthcare and millions of healthcare professionals and their patients, as well as increasingly networked nature of our society, create a context where QIE, IPL, and TEL are increasingly important. While those changes can be labeled as political, professional, managerial, and technical, or changes in instructional practices, they are all deeply social. They affect how we—as individuals and society—view and create our personal and our shared reality.

My goal was to explore the existing practices and how the practices and upcoming changes are perceived; how that relates to the findings from literature and evolving demands from society; and, most importantly, how we can use those findings to improve CPD of perioperative teams. Answering *what* and *how* is an important first step. It gives us insight into what is out there, and it empowers us to make changes in the empirical layer of our reality. Simultaneously, it provides only limited access to the other two layers—the actual and the real. Therefore, improvement driven by answers to "what" and "how" questions usually has limited scope. To make more substantial improvement we need to address the "why" question (Dalkin et al., 2015).

Answering the why question. During this research I discovered that answering "why" is crucial to the impact of this research and for me personally. Due to my background, I felt I'm familiar with a considerable amount of observational evidence. However, I wasn't able to explain the "why." That reminded me of ancient ways to practice medicine when we were observing and treating symptoms. Nowadays, we know that instead of symptoms, we should treat the root cause. That is why I was eager to invest significant effort to answer the "why" question. As discussed under Methodology, this research has evolved from a case study built primarily on phenomenographic research, to a case study that interprets the findings from TA through a lens of critical realist ontology. Answering the "why" question means that, as Sutton and Staw (1995, p. 378) noted, I have to create a theory "*about connections among phenomena, a story about why acts, events, structures, and thoughts occur*." That was a considerable effort, but an opportunity to grow. I had to learn a lot about how to address reasons why examples of theory development (Ashwin, 2012), as well examples of critical realist-informed research (Ackroyd & Karlsson, 2014) are still quite rare.

In this closing chapter I will reflect on the research ventured and outcomes of the study. I will do that in these three areas:

- The unique new contribution this research makes to the existing body of knowledge.
- The limitations and delimitations that should be considered while interpreting the findings.
- The directions for future research that seems to be promising—whether to address the identified gaps or to build on findings from this research.

Although this research is built on a long tradition of IPL, QIE, and TEL research in healthcare, the need for additional research is constantly growing.

6.2 NEW KNOWLEDGE

This study contributes to new knowledge in three areas:

1) **Education of perioperative teams** is the first area of contribution. As the Literature Review illustrates, technology-enhanced QIE and IPL of perioperative teams are not well-researched topics. This is the first research that analyzes how the QIE, IPL, and TEL complex is perceived in the context of the U.S. perioperative teams, transformative changes affecting U.S. healthcare and our increasingly networked society. Simultaneously QIE, IPL, and TEL are proven to be important elements in the education of perioperative teams and secondary to that in improvement of healthcare outcomes. Therefore, studies like this one are needed to fill this gap. The TA provides vivid description of that dynamic system and many of the findings have value on their own. Perioperative leaders and CPD professionals can use these findings to improve learning programming of perioperative teams.
2) **Evolution of learning systems theory** is another contribution that can help us interpret seemingly chaotic changes affecting QIE, IPL, and TEL in the perioperative context. The theory is developed by combining Bawden (2010) worldview matrix, patterns discovered in the TA and patterns from our bio-social evolution, Kolb's experiential learning, and development of a person. Through critical realist abduction I was able to showcase the gap between the world we know, and the findings of this study. That created, as Ashwin (2012, p. 953) explains, fertile soil for "*development of theory through empirical research*." Later, I was able to use retroductive logic to create a theory filling the gap. The outcome is a theory that our world, and perioperative teams as part of it, act as agglomeration of nested learning systems. In each layer of nesting hierarchy, systems have been evolving through egocentric, technocentric, ecocentric, and holocentric modalities. Those modalities reflect ontological and epistemological transformations. Through the evolution of learning systems theory, we can better understand dynamic of differences between nursing and medical worldviews, as well as opportunities and challenges affecting implementation of LHS and its subsystems—QIE, IPL, and TEL. The theory serves as a new lens to interpret findings from TA. Perioperative teams can use that as a tool to improve their epistemological responsibility.

   Epistemological responsibility will empower perioperative teams to utilize multiple epistemologies and find more complete answers to complex needs of various patients, and work better as a productive learning system.
3) **Example of critical realist research and its comparison with medical thinking** is a small but still noteworthy contribution of this work. The thesis answers the call of

many authors to use critical realism in healthcare (For example: Pilgrim, 2013; S. J. Williams, 1999). Therefore, the thesis uses many analogies with the traditional clinical thinking, mainly to better illustrate the process to readers from the healthcare community. The logic is: "the critical realist theory building process I'm using is very similar to the thinking process clinicians are using while making diagnosis (theory about the mechanism that is causing symptoms)." Data shows that medical thinking fails very often and that 134,000-400,000 Americans die each year due to medical error (James, 2013; Makary & Daniel, 2016). Furthermore, the increasingly complex nature of the healthcare system has become a considerable challenge affecting daily practice. Therefore, it is fair to assume that traditional induction + deduction models (Rashotte & Carnevale, 2004) don't address all needs of increasingly complex healthcare delivery. Observing the clinical diagnosis process through critical realist lens can help address those challenges.

6.3 LIMITATIONS OF THE STUDY

This study comes with a series of limitations that should be considered while interpreting the findings. Those are: small scope of the research, limited, self-selected sample of participants, limited reliability and generalizability of findings in other contexts, or in the same context when it is in different stage, and unique perspective of this research.

Scope. This research analyzes four complex phenomena located in a complex socio-political context. Therefore, I had to be very selective in prioritizing which elements of the system will be analyzed, and how deep analysis of each element will be. That was a big task. The dynamic complexity of the phenomena is manifested as constantly evolving systems—where always something new can be described. One of the methods that helped me address complexity and associated scope was focusing on the relationship between phenomena, instead of being primarily focused on phenomena per se (Bleakley & Cleland, 2015; Wynn Jr & Williams, 2012).

Conceptualizing complexity. On the other side of the scope issue is the evolving capacity of the researcher to conceptualize complexity of the phenomena being researched, and the need to customize ontological assumptions and methodology to better address that complexity. This research started as a phenomenographic case study. I was struggling with phenomenographic methodology until I figured that layered critical realist ontology provides better insight into mechanisms behind the observed phenomena than phenomenographic non-dualistic ontology—where the real world can be observed only through our experience and understanding (Marton, 2000).

The participant group, as discussed in Recruitment (page 88), is made primary of leaders and enthusiasts. This helped me gain deeper insight into this topic and better understand the transformative dynamics of QIE, IPL, and TEL and the direction that such transformation is taking. On the other hand, this limited my insight into "the average perception" of all perioperative clinicians and their CPD providers.

Additional limitations related to interviewing participants is that I was able to collect and analyze what interviewees told me about their experiences, not exactly their experience. That is a common issue that to some degree affects all interviews (Alshenqeeti, 2014). However, in this case it may have a bigger impact. Due to the political, professional, and financial nature of conflict between professions it is possible that some comments related to interprofessional issues were significantly filtered.

Reliability of findings—especially findings from TA—is often questioned. In some cases researchers try to increase reliability of findings by coding the data by multiple independent coders (Vaismoradi, Turunen, & Bondas, 2013). Nevertheless, that can be only of limited value for TA as purely qualitative methodology—especially in the research like this one where a primarily inductive approach was used to code a significant amount of data about complex phenomena (Braun & Clarke, 2006). Marton's (1986, p. 35) analogy of expeditions of botanist researching "*previously unknown flora and fauna on a remote island*" and findings from qualitative research comes in handy here. Just as we can't expect that two expeditions will follow the same process of discovery while researching fauna on the island, we can't expect that two qualitative researches will generate the same or even similar findings from TA. Let's imagine that one expedition was focused on a few exotic species, and another expedition was primarily focused on the ecosystem flora and fauna create on that remote island. Findings in both areas can make significant contribution to knowledge, yet they are significantly different.

Critical realism. Common limitations of critical realist research is that usually it doesn't support generalization because of contextual variations—different contexts have different characteristics. While two contexts can share many basic characteristics, the unique history of each context and independent evolutions of practices create a unique mix (Kempster & Parry, 2011). Therefore, the findings can't be generalized over the U.S. perioperative team context. Another limitation is interference of the mechanism described in the theory with other mechanisms. The theory proposes cyclical but linear progression of our world. Yet, we know that the social world is non-linear (M. Williams, 2014). Therefore, insight into additional mechanisms may be needed. In the same manner, it would be beneficial to find how outcomes of the same mechanism located in various parts of our society and layers of our reality, are interacting, while transformations happening in various context are progressing each at unique speed.

FUTURE RESEARCH DIRECTIONS

This research analyzes three phenomena that act as subsystems intimately imbedded in the fabric of LHS and the U.S. healthcare system, and it provides a theory of evolution of learning systems. While the research answers a few questions, it exposes the need for future research in various areas. I will name a few that I find the most urgent.

Theory testing and assessing interaction of the described mechanism with other mechanisms is probably the most important one. The theory presents a mechanism that has been transforming our learning systems on any level of agglomeration. Validity of the theory was proven in a series of examples. Yet, realist evaluation teaches us that in a specific context, mechanisms can be activated or deactivated, and, if activated, the mechanism can interact with other mechanisms in various ways, creating unique outcomes (Ogrinc & Batalden, 2009). Figure 59 below illustrates that process.

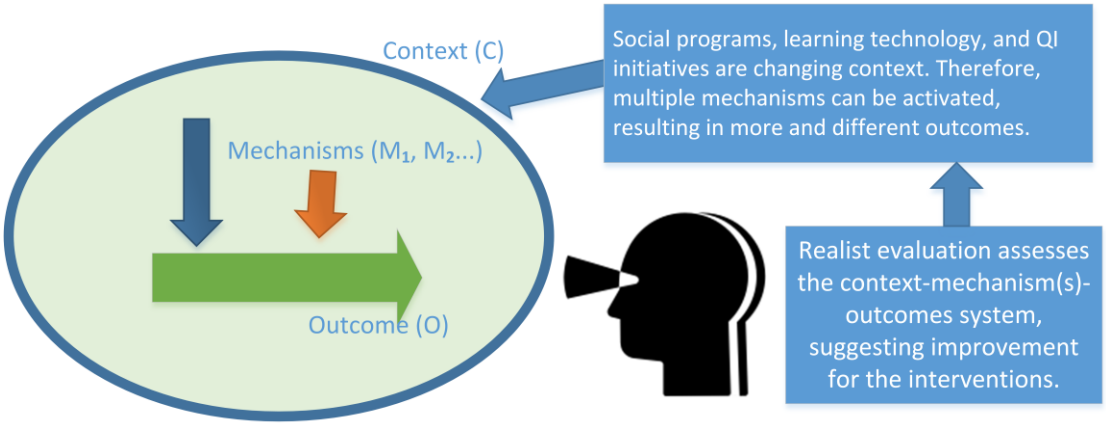


Figure 59. Realist evaluation
Changing context triggers additional mechanisms, and alters outcomes.

Furthermore, the same mechanism on various parts/levels of our world can create conflicting outcomes. Therefore, a learning system on the national level may negatively impact a learning system on the level of the PSH team. For example, pay-for-performance as initiatives that reward performance of specific easy–to-measure behaviors, and are focused mainly on behavior of individual clinicians, can negatively impact learning that is happening on the level of perioperative teams (Berenson & Rice, 2016; Wynia, 2009). That conflict raises a dilemma: "*Why would we in this perioperative team invest in learning and innovation, when on the national level, the system is paying us to use predefined processes?*" We can interpret that as a conflict between a very technocentric learning system built around operant conditioning (behaviorism) on a national level, and attempt to use an ecocentric or holocentric learning system focused on collaborative constructivist learning modalities on the local level.

Replication of the same research format but focused on just one profession, or focused on ontological and epistemological differences between professions, will contribute findings of

this research and further empower leaders to improve CPD programing for perioperative teams and improve their epistemological responsibility. Due to the complex and evolving nature of the phenomena being studied, it may be worthwhile to repeat the same research in the same context every 3-5 years.

Additional questions that become noticeable during the research are:

- How can we use technology and networked learning principles to ease our move toward holocentric LHS?
- What are good practices for technology enhanced QIE and IPL?
- How are our plans to use technology-enhanced QIE and IPL aligning with our ontological and epistemological worldviews?
- What are the best methods to address a century-long conflict between nurse-anesthetists and physician anesthesiologists—so that we can raise social capital needed for good IPL.

Those questions are well-positioned between theory and practice. Answering them can contribute to the theoretical knowledge base. Yet, since they are tightly connected to practice, they will, I believe, provide actionable data needed to improve CPD of perioperative teams.

6.4 REFLECTION ON THE RESEARCH ENDEAVOR

During this study I was driven by my growing interest in collaborative, social learning practices and their impact on real-life activities of perioperative clinicians. While I am finishing my thesis I'm increasingly aware that this research is just a small drop in the sea of knowledge; that it is neither perfect nor complete. Yet, I hope the thesis showcases the effort and ambition to deliver and document good research.

I see this research as a map toward my new research projects, and—for me—an important stepping stone to "get out there." Since my research questions are answered, I will mark this research paper completed. I'm aware that my research findings are partial, that answers are valid only in a specific time and specific context, observed through a specific ontology. Therefore, simultaneously as marking the end of the research, answers serve as a launching platform for follow-up questions and contribute to our infinite ambition to better know ourselves and the world we live in.

7 REFERENCES

AAMC, Association of American Medical Colleges (2014, October 2014). Medical student education: Debt, costs, and loan repayment fact card. Retrieved from https://www.aamc.org/download/152968/data/debtfactcard.pdf

AAP, American Academy of Pediatrics. (1974). *Fragmentation of health care services for children*. Evanston, IL, USA: American Academy of Pediatrics.

AAP, American Academy of Pediatrics. (2002). The medical home - medical home initiatives for children with special needs project advisory committee. *Pediatrics, 110*(1), 184-186.

ABIM, Foundation, ACP-ASIM, Foundation, & EFIM, European Federation of Internal Medicine. (2002). Medical professionalism in the new millennium: A physician charter. *Acta Clinica Belgica, 57*(4), 169-171.

ACCME, Accreditation Council for Continuing Medical Education. (2016). *Accreditation council for continuing medical education (ACCME®) 2015 annual report*. Retrieved from Chicago: http://www.accme.org/sites/default/files/630_20160719_2015_Annual_Report.pdf

Achor, T. S., & Ahn, J. (2014). Becoming the "captain of the ship" in the or. *Journal of Orthopaedic Trauma, 28*, S18-S19. doi:10.1097/bot.0000000000000180

Ackroyd, S., & Karlsson, J. C. (2014). Critical realism, research techniques, and research designs. In P. K. Edwards, J. O'Mahoney, & S. Vincent (Eds.), *Studying organizations using critical realism: A practical guide* (Vol. 1, pp. 22-45). 198 Madison Avenue, New York, NY 10016, U.S.: Oxford University Press, Great Clarendon Street, Oxford, OX2 6DP, UK.

Adinolfi, P. (2014). Barriers to reforming healthcare: The Italian case. *Health Care Analysis, 22*(1), 36-58. doi:10.1007/s10728-012-0209-0

Adler-Milstein, J., & Jha, A. K. (2014). Health information exchange among US hospitals: Who's in, who's out, and why? *Healthcare, 2*(1), 26-32.

AGS, American Geriatrics Society Expert Panel on Person-Centered Care, Brummel-Smith, K., Butler, D., Frieder, M., Gibbs, N., Henry, M., . . . Reuben, D. B. (2016). Person-centered care: A definition and essential elements. *Journal of the American Geriatrics Society, 64*(1), 15-18.

Ahn, A. C., Tewari, M., Poon, C.-S., & Phillips, R. S. (2006). The limits of reductionism in medicine: Could systems biology offer an alternative? *PLOS Medicine, 3*(6), e208. doi:10.1371/journal.pmed.0030208

ahrq.gov, Agency for Healthcare Research and Quality. (2015). 2013 annual hospital-acquired condition rate and estimates of cost savings and deaths averted from 2010 to 2013. Retrieved 7/11/2017 https://www.ahrq.gov/sites/default/files/publications/files/hacrate2013_0.pdf

Allen, D. K., Brown, A., Karanasios, S., & Norman, A. (2013). How should technology-mediated organizational change be explained? A comparison of the

contributions of critical realism and activity theory. *Mis Quarterly, 37*(3), 835-854.

Allen, K. E., & Cherrey, C. (2000). *Systemic leadership: Enriching the meaning of our work*: University Press of America, Lanham, MD, U.S.

Allen, R. (1991). Reductionism in education. *Philosophical Inquiry in Education, 5*(1), 20-35.

Alligood, M. R. (2014). *Nursing theory: Utilization & application* (5th ed.). St. Louis, MO.

Alshenqeeti, H. (2014). Interviewing as a data collection method: A critical review. *English Linguistics Research, 3*(1), 39.

AMA, American Medical Association. (2017, 2017/9/12). Performance improvement continuing medical education (PI CME). *Continuing Medical Education.* Retrieved from https://www.ama-assn.org/education/performance-improvement-continuing-medical-education-pi-cme#

Amin, Z. (2000). Theory and practice in continuing medical education. *Annals of the Academy of Medicine, 29*(4), 498-502.

Anderson, G., & Arsenault, N. (2005). *Fundamentals of educational research*: Routledge.

Andrews, T. (2012). What is social constructionism? *The Grounded Theory Review, 11*(1), 39-46.

Archer, J., & de Bere, S. R. (2013). The United Kingdom's experience with and future plans for revalidation. *Journal of Continuing Education in the Health Professions, 33*(S1), S48-S53. doi:10.1002/chp.21206

Archer, M. S. (2003). *Structure, agency and the internal conversation*. UK: Cambridge University Press.

Archer, M. S., Bhaskar, R., Collier, A., Norrie, A., & Lawson, T. (1998). *Critical realism: Essential readings* (Vol. 6 of Critical Realism): Routledge.

ASA, Americaln Society of Anesthesiologists (1973). ASA refresher courses in anesthesiology - volume 1. *ASA Refresher Courses in Anesthesiology, 1*(1), 1-167.

ASAHQ.org, American Society of Anesthesiologists. (2014a). Learning collaborative to advance the perioperative surgical home (PSH) [Press release]. Retrieved from http://www.asahq.org/~/media/PSHMicro/May2014PSH_Information.pdf

ASAHQ.org, American Society of Anesthesiologists. (2014b). Perioperative surgical home overview. Retrieved from http://www.asahq.org/psh

Ashwin, P. (2005). Variation in students' experiences of the 'Oxford tutorial'. *Higher Education, 50*(4), 631-644.

Ashwin, P. (2012). How often are theories developed through empirical research into higher education? *Studies in Higher Education, 37*(8), 941-955. doi:10.1080/03075079.2011.557426

Balmer, J. T. (2013). The transformation of continuing medical education (CME) in the United States. *Advances in Medical Education and Practice, 4*, 171.

Banks, J. A. (1998). The lives and values of researchers: Implications for educating citizens in a multicultural society. *Educational Researcher, 27*(7), 4-17.

Barab, S. A., Evans, M. A., & Baek, E.-O. (2004). Activity theory as a lens for characterizing the participatory unit. *Handbook of research on educational communications and technology, 2*, 199-213.

Barley, M. (2012). Learning from reflective practice and metacognition – an anaesthetist's perspective. *Reflective Practice, 13*(2), 271-280. doi:10.1080/14623943.2012.657792

Barnard, A. (2002). Philosophy of technology and nursing. *Nursing Philosophy, 3*(1), 15-26.

Baron, R. J. (2015, 2/3/2015). ABIM announces immediate changes to MOC program. *ABIM News.* Retrieved from http://www.abim.org/news/abim-announces-immediate-changes-to-moc-program.aspx

Barr, H. (2002). *Interprofessional education-today, yesterday and tomorrow* (1118410866). Retrieved from https://www.caipe.org/resources/publications/caipe-publications/caipe-2002-interprofessional-education-today-yesterday-tomorrow-barr-h

Barr, H. (2013). Toward a theoretical framework for interprofessional education. *Journal of Interprofessional Care, 27*(1), 4-9. doi:10.3109/13561820.2012.698328

Batalden, P. B., & Davidoff, F. (2007). What is "quality improvement" and how can it transform healthcare? *Quality and Safety in Health Care, 16*(1), 2-3.

Batalden, P. B., Nelson, E. C., Edwards, W. H., Godfrey, M. M., & Mohr, J. J. (2003). Microsystems in health care: Part 9. Developing small clinical units to attain peak performance. *Joint Commission Journal on Quality and Patient Safety, 29*(11), 575-585.

Bate, P. (2000). Changing the culture of a hospital: From hierarchy to networked community. *Public Administration, 78*(3), 485-512.

Bates, A. W. T. (2000). Chapter two – leadership, vision, and planning in a post-fordist organization. In *Managing technological change : Strategies for college and university leaders* (pp. 41): Jossey-Bass Publishers.

Bates, A. W. T. (2008). Transforming distance education through new technologies. In T. Evans, M. Haughey, & D. Murphy (Eds.), *The international handbook of distance education*. Bingley, U.K.: Emerald Press.

Bates, A. W. T. (2015, 1/27/2016). Is networked learning experiential learning? Retrieved from http://www.tonybates.ca/2016/01/27/is-networked-learning-experiential-learning/

Bawden, R. (2010). The community challenge: The learning response. In *Social learning systems and communities of practice* (pp. 39-56): Springer.

Begun, J. W., Zimmerman, B., & Dooley, K. (2003). Health care organizations as complex adaptive systems. *Advances in Halth Care Organization Theory, 253*, 288.

Bendo, A. A. (2013). 'Winning the war, 'Emery A. Rovenstine Memorial Lecture: John B. Neeld, Jr., MD, 1999 ASA President. *ASA Newsletter, 77*(7), 30-30.

Berenson, R. A., & Rice, T. (2016). Beyond measurement and reward: Methods of motivating quality improvement and accountability. *Health services research, 50*(S2), 2155-2186.

Berwick, D. (2007). Eating soup with a fork. *19th National Forum on Quality Improvement in Healhtcare keynote address.* Retrieved from https://www.youtube.com/watch?v=dTbq9cpH3BQ

Berwick, D. (2013). *Promising care: How we can rescue health care by improving it*: John Wiley & Sons.

Berwick, D. (2016). Era 3 for medicine and health care. *Journal of the American Medical Association, 315*(13), 1329-1330. doi:10.1001/jama.2016.1509

Berwick, D., & Hackbarth, A. (2012). Eliminating waste in US health care. *Jama, 307*(14), 1513-1516.

Bhaskar, R. (2008). *A realist theory of science* (Vol. 29). 2 Park Square, Milton Park, Abingdon, Oxon, OX 14 4RN, UK: Routledge.

Bhaskar, R. (2014). Foreword In P. K. Edwards, J. O'Mahoney, & S. Vincent (Eds.), *Studying organizations using critical realism: A practical guide* (Vol. 1, pp. vi - xvi). 198 Madison Avenue, New York, NY 10016, U.S.: Oxford University Press, Great Clarendon Street, Oxford, OX2 6DP, UK.

Billett, S. (2009). Personal epistemologies, work and learning. *Educational Research Review, 4*(3), 210-219.

Blackler, F., Crump, N., & McDonald, S. (2000). Organizing processes in complex activity networks. *Organization, 7*(2), 277-300.

Bleakley, A., Bligh, J., & Browne, J. (2011). *Medical education for the future: Identity, power and location* (Vol. 1). Advances in Medical Education: Springer Netherlands.

Bleakley, A., & Cleland, J. (2015). Sticking with messy realities: How "thinking with complexity" can inform healthcare education research. In J. Cleland & S. J. Durning (Eds.), *Researching medical education* (Vol. 1, pp. 81-92). Chichester, West Sussex, PO198SQ, UK E: John Wiley & Sons,.

Bligh, B., & Flood, M. (2017). Activity theory in empirical higher education research: Choices, uses and values. *Tertiary Education and Management, 23*(2), 125-152.

Blin, F., & Munro, M. (2008). Why hasn't technology disrupted academics' teaching practices? Understanding resistance to change through the lens of activity theory. *Computers Education, 50*(2), 475-490.

Bloom, S. W. (1988). Structure and ideology in medical education: An analysis of resistance to change. *Journal of Health and Social Behavior, 29*(4), 294-306. doi:10.2307/2136864

Boix, C., & Posner, D. N. (1998). Social capital: Explaining its origins and effects on government performance. *British Journal of Political Science, 28*(04), 686-693.

Booth, K., Kenrick, M., & Woods, S. (1997). Nursing knowledge, theory and method revisited. *Journal of Advanced Nursing, 26*(4), 804-811. doi:10.1046/j.1365-2648.1997.00353

Bornkessel, A., Furberg, R., & Lefebvre, R. C. (2014). Social media: Opportunities for quality improvement and lessons for providers—a networked model for patient-centered care through digital engagement. *Current cardiology reports, 16*(7), 1-9.

Boyd, R., Richerson, P. J., & Henrich, J. (2011). The cultural niche: Why social learning is essential for human adaptation. *Proceedings of the National Academy of Sciences, 108*(Supplement 2), 10918-10925. doi:10.1073/pnas.1100290108

Boysen, P. G., Daste, L., & Northern, T. (2016). Multigenerational challenges and the future of graduate medical education. *The Ochsner Journal, 16*(1), 101-107.

Braithwaite, J. (2015). Bridging gaps to promote networked care between teams and groups in health delivery systems: A systematic review of non-health literature. *British Medical Journal, 5*(9), e006567.

Brannick, T., & Coghlan, D. (2007). In defense of being "native": The case for insider academic research. *Organizational Research Methods, 10*(1), 59-74. doi:10.1177/1094428106289253

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77-101.

Braun, V., & Clarke, V. (2014). What can "thematic analysis" offer health and wellbeing researchers? *International Journal of Qualitative Studies on Health And Well-Being, 9*.

Brill, S. (2015). *America's bitter pill: Money, politics, backroom deals, and the fight to fix our broken healthcare system*. Random House Publishing Group: Random House Trade Paperbacks.

Britannica, The Editors of Encyclopaedia Britannica. (2018, May 17, 2018). Technology. *Encyclopædia Britannica.* Retrieved from https://www.britannica.com/technology/technology

Britto, M. T., Fuller, S. C., Kaplan, H. C., Kotagal, U., Lannon, C., Margolis, P. A., . . . Seid, M. (2018). Using a network organisational architecture to support the development of learning healthcare systems. *BMJ Quality & Safety*. doi:10.1136/bmjqs-2017-007219

Britton, J. R. (2015). Healthcare reimbursement and quality improvement: Integration using the electronic medical record: Comment on" fee-for-service payment-an evil practice that must be stamped out?". *International Journal of Health Policy and Management, 4*(8), 549.

Brives, C., Le Marcis, F., & Sanabria, E. (2016). What's in a context? Tenses and tensions in evidence-based medicine. *Medical Anthropology, 35*(5), 369-376. doi:10.1080/01459740.2016.1160089

Brown, C. R., & Fleisher, D. S. (2014). The bi-cycle concept—relating continuing education directly to patient care. *Journal of Continuing Education in the Health Professions, 34*(2), 141-148.

Bullen, M., Morgan, T., & Qayyum, A. (2011). Digital learners in higher education: Generation is not the issue. *Canadian Journal of Learning and Technology/La revue canadienne de l'apprentissage et de la technologie, 37*(1).

Bunniss, S., & Kelly, D. R. (2010). Research paradigms in medical education research. *Medical education, 44*(4), 358-366.

Burns, V. F., Macdonald, M. E., & Carnevale, F. A. (2018). Epistemological oppression and the road to awakening: A boot camp, a twitter storm, and a call to action! *International Journal of Qualitative Methods, 17*(1), 1609406918763413. doi:10.1177/1609406918763413

Caesar, S. (2016). Royal college of general practitioners: RCGP guide to supporting information for appraisal and revalidation.

CAIPE, Centre For The Advancement Of Interprofessional Education. (2002). Interprofessional education - The definition. Retrieved from http://caipe.org.uk/resources/defining-ipe/

Campbell, G. (2016). Networked learning as experiential learning. *Educause Review, Vol. 51 No., 50*(1, January 11), 1.

Carter, P., Ozieranski, P., McNicol, S., Power, M., & Dixon-Woods, M. (2014). How collaborative are quality improvement collaboratives: A qualitative study in stroke care. *Implementation Science, 9*(1), 32.

Caulley, D. N. (2008). Making qualitative research reports less boring: The techniques of writing creative nonfiction. *Qualitative inquiry, 14*(3), 424-449.

census.gov, US Census Bureau. (2018, 2/7/2018). Population clock. Retrieved from www.census.gov/popclock/

Cervero, R. M., & Moore Jr., D. E. (2011). The cease smoking today (CS2day) initiative: A guide to pursue the 2010 IOM report vision for CPD. *Journal of Continuing Education in the Health Professions, 31*(S1), S76-S82.

Cheston, C. C., Flickinger, T. E., & Chisolm, M. S. (2013). Social media use in medical education: A systematic review. *Academic Medicine, 88*(6), 893-901.

Cho, S., Mathiassen, L., & Nilsson, A. (2008). Contextual dynamics during health information systems implementation: An event-based actor-network approach. *European Journal of Information Systems, 17*(6), 614-630.

CIHC, The Canadian Interprofessional Health Collaborative. (2008). Rising interest in IPL. In. cihc.ca: The Canadian Interprofessional Health Collaborative.

Clark, A. M. (1998). The qualitative-quantitative debate: Moving from positivism and confrontation to post-positivism and reconciliation. *Journal of advanced nursing, 27*(6), 1242-1249.

Clark, A. M., MacIntyre, P. D., & Cruickshank, J. (2007). A critical realist approach to understanding and evaluating heart health programmes. *Health, 11*(4), 513-539. doi:10.1177/1363459307080876

Clark, P. G. (2006). What would a theory of interprofessional education look like? Some suggestions for developing a theoretical framework for teamwork training. *Journal of Interprofessional Care, 20*(6), 577-589.

Cleland, J., & Durning, S. J. (2015). *Researching medical education*: John Wiley & Sons.

Clemmer, T. P. (2004). Computers in the ICU: Where we started and where we are now. *Journal of Critical Care, 19*(4), 201-207.

Clot, Y. (2009). Clinic of activity: The dialogue as instrument. In Annalisa Sannino, H. Daniels, & K. D. Gutierrez (Eds.), *Learning and expanding with activity theory* (pp. 286-302). Cambridge, UK: Cambridge University Press.

Clough, J. D., & McClellan, M. (2016). Implementing MACRA: Implications for physicians and for physician leadership. *JAMA, 315*(22), 2397-2398. doi:10.1001/jama.2016.7041

Medicare program; merit-based incentive payment system (mips) and alternative payment model (apm) incentive under the physician fee schedule, and criteria for physician-focused payment models, 2016-25240 C.F.R. (2017).

COA, The Council on Accreditation of Nurse Anesthesia Educational Programs. (2007). COA position statements. Retrieved from http://home.coa.us.com/about/Pages/COA-Position-Statements.aspx

Cochran-Smith, M., Ell, F., Grudnoff, L., Ludlow, L., Haigh, M., & Hill, M. (2014). When complexity theory meets critical realism: A platform for research. *Teacher Education Quarterly*.

Colbeck, C. L. (1998). Merging in a seamless blend: How faculty integrate teaching and research. *Journal of Higher Education*, 647-671.

Cook, D. A., Blachman, M. J., Price, D. W., West, C. P., Thomas, B., Barbara, L., . . . Wittich, C. M. (2018). Educational technologies for physician continuous professional development: A national survey. *Academic Medicine, 93*(1), 104-112.

Cooke, M., Irby, D. M., & O'Brien, B. C. (2010). *Educating physicians: A call for reform of medical school and residency* (Vol. 16). San Francisco, CA, U.S.: John Wiley & Sons.

Cooke, M., Irby, D. M., Sullivan, W., & Ludmerer, K. M. (2006). American medical education 100 years after the Flexner Report. *New England Journal of Medicine, 355*(13), 1339-1344. doi:doi:10.1056/NEJMra055445

Coombs, M., & Ersser, S. J. (2004). Medical hegemony in decision-making – a barrier to interdisciplinary working in intensive care? *Journal of Advanced Nursing, 46*(3), 245-252. doi:10.1111/j.1365-2648.2004.02984.x

Costanza, M., DiCowden, M., & Row, C. (2014). Towards interprofessional team development: A policy paper of the National Academies of Practice. *Journal of Interprofessional Healthcare, 1*(1), 2.

Cramer, F. (2015). What is 'post-digital'? In *Postdigital aesthetics* (pp. 12-26): Springer.

Cruess, R. L., Cruess, S. R., & Steinert, Y. (2015). Amending miller's pyramid to include professional identity formation. *Academic Medicine*.

Curran, V., Fleet, L., & Kirby, F. (2010). A comparative evaluation of the effect of internet-based CME delivery format on satisfaction, knowledge and confidence. *BMC Medical Education, 10*(1), 10.

Cutajar, M. (2014). *Qualitative differences in post-compulsory pre-university maltese students' accounts of their networked learning experiences.* Lancaster University,

Dalkin, S. M., Greenhalgh, J., Jones, D., Cunningham, B., & Lhussier, M. (2015). What's in a mechanism? Development of a key concept in realist evaluation. *Implementation Science, 10*(1), 49. doi:10.1186/s13012-015-0237-x

Dall'Alba, G., & Barnacle, R. (2007). An ontological turn for higher education. *Studies in Higher Education, 32*(6), 679-691.

Daly, S. R. (2008). *Design across disciplines.* Purdue University. Engineering, Education, Ann Arbor, MI, U.S. Retrieved from http://books.google.hr/books?id=dSE4uvnBskMC

Damiano, L., & Luisi, P. L. (2010). Towards an autopoietic redefinition of life. *Origins of Life and Evolution of Biospheres, 40*(2), 145-149.

Davidoff, F., Dixon-Woods, M., Leviton, L., & Michie, S. (2015). Demystifying theory and its use in improvement. *BMJ Quality & Safety*, bmjqs-2014-003627.

Davies, P., Walker, A. E., & Grimshaw, J. M. (2010). A systematic review of the use of theory in the design of guideline dissemination and implementation strategies and interpretation of the results of rigorous evaluations. *Implementation Science, 5*(14), 5908-5905.

Davis, D., Fox, R. D., & Barnes, B. E. (2003). The horizon of continuing professional development: Five questions in knowledge translation. In D. Davis, B. E.

Barnes, & R. D. Fox (Eds.), *Continuing professional development of physicians* (pp. 9-14). Chicago, U.S.: American Medical Association.

Davis, D., O'Brien, M., Freemantle, N., Wolf, F. M., Mazmanian, P., & Taylor-Vaisey, A. (1999). Impact of formal continuing medical education: Do conferences, workshops, rounds, and other traditional continuing education activities change physician behavior or health care outcomes? *JAMA, 282*(9), 867-874. doi:10.1001/jama.282.9.867

Davis, K., Stremikis, K., Schoen, C., & Squires, D. (2014). Mirror, mirror on the wall, 2014 update: How the US health care system compares internationally. Retrieved from http://www.commonwealthfund.org/publications/fund-reports/2014/jun/mirror-mirror

De Feijter, J. M., De Grave, W. S., Dornan, T., Koopmans, R. P., & Scherpbier, A. J. (2011). Students' perceptions of patient safety during the transition from undergraduate to postgraduate training: An activity theory analysis. *Advances in Health Sciences Education, 16*(3), 347-358.

De Houwer, J., Barnes-Holmes, D., & Moors, A. (2013). What is learning? On the nature and merits of a functional definition of learning. *Psychonomic Bulletin & Review, 20*(4), 631-642. doi:10.3758/s13423-013-0386-3

DeBruyne, N. F. (2018). *American war and military operations casualties: Lists and statistics*. (RL32492). https://fas.org/sgp/crs/natsec/RL32492.pdf: Congressional Research Service.

Decker, S. I., Anderson, M., Boese, T., Epps, C., McCarthy, J., Motola, I., . . . Scolaro, K. (2015). Standards of best practice: Simulation standard VIII: Simulation-enhanced interprofessional education (sim-IPE). *Clinical Simulation in Nursing, 11*(6), 293-297.

Denzin, N. K. (2017). *Qualitative inquiry under fire: Toward a new paradigm dialogue*: Routledge.

Dev, P., & Heinrichs, W. L. (2008). Learning medicine through collaboration and action: Collaborative, experiential, networked learning environments. *Virtual Reality, 12*(4), 215-234.

Diamond, L., Kues, J., & Sulkes, D. (2015). *The quality improvement education (QIE) roadmap: A pathway to our future*. Retrieved from http://www.acehp.org/p/cm/ld/fid=209

Diaz, F. G. (2015). How Obamacare will affect you: An editorial. *Neurosurgery, 62*, 81-91.

Dirckinck-Holmfeld, L., Jones, C., & Lindström, B. (2009). Analysing networked learning practices in higher education and continuing professional development.

Dixon-Woods, M., Leslie, M., Tarrant, C., & Bion, J. (2013). Explaining matching michigan: An ethnographic study of a patient safety program. *Implementation Science : IS, 8*, 70-70. doi:10.1186/1748-5908-8-70

Djulbegovic, B., & Guyatt, G. H. (2017). Progress in evidence-based medicine: A quarter century on. *The Lancet, 390*(10092), 415-423.

Djulbegovic, B., Guyatt, G. H., & Ashcroft, R. E. (2009). Epistemologic inquiries in evidence-based medicine. *Cancer Control, 16*(2), 158-168.

Doyle, A. C. (1900). *The sign of the four 1890*: F.M. Lupton Publishing Company.

Drucker, P. F. (1963). Managing for business effectiveness. *Harvard Business Review*(May).

Drucker, P. F. (1975). *The practice of management*: Allied Publishers.

Duhem, P. M. M. (1991). *The aim and structure of physical theory* (Vol. 13): Princeton University Press.

Dyrbye, L. N., & Shanafelt, T. D. (2011). Physician burnout: A potential threat to successful health care reform. *JAMA, 305*(19), 2009-2010. doi:10.1001/jama.2011.652

Easton, G. (2010). Critical realism in case study research. *Industrial Marketing Management, 39*(1), 118-128.

Edmondson, A. C. (2004). Learning from mistakes is easier said than done: Group and organizational influences on the detection and correction of human error. *The Journal of Applied Behavioral Science, 40*(1), 66-90.

Edwards, P. K., O'Mahoney, J., & Vincent, S. (2014). *Studying organizations using critical realism: A practical guide* (Vol. 17): OUP Oxford.

Eichenwald, K. (2015). The ugly civil war in American medicine. *Newsweek.* Retrieved from http://www.newsweek.com/2015/03/27/ugly-civil-war-american-medicine-312662.html

Eijkenaar, F. (2013). Key issues in the design of pay for performance programs. *The European Journal of Health Economics, 14*(1), 117-131. doi:10.1007/s10198-011-0347-6

Ekman, I., Swedberg, K., Taft, C., Lindseth, A., Norberg, A., Brink, E., . . . Kjellgren, K. (2011). Person-centered care—ready for prime time. *European Journal of Cardiovascular Nursing, 10*(4), 248-251.

Elder-Vass, D. (2010). *The causal power of social structures: Emergence, structure and agency*. UK, Cambridge: Cambridge University Press.

Engeström, Y. (2000). Activity theory as a framework for analyzing and redesigning work. *Ergonomics, 43*(7), 960-974.

Engeström, Y. (2001). Expansive learning at work: Toward an activity theoretical reconceptualization. *Journal of Education and Work, 14*(1), 133-156.

Engeström, Y. (2009a). Expansive learning: Toward an activity-theoretical reconceptualization. In *Contemporary theories of learning* (pp. 46-65): Routledge.

Engeström, Y. (2009b). The future of activity theory: A rough draft. In A. Sannino, Harry Daniels, & K. D. Gutiérrez (Eds.), *Learning and expanding with activity theory* (pp. 303-328). Cambridge, UK: Cambridge University Press.

Engeström, Y. (2014). *Learning by expanding*: Cambridge University Press.

Engeström, Y., Virkkunen, J., Helle, M., Pihlaja, J., & Poikela, R. (1996). The change laboratory as a tool for transforming work. *Lifelong Learning in Europe, 1*(2), 10-17.

Erikson, E. H., & Erikson, J. M. (1998). *The life cycle completed (extended version)*: WW Norton & Company.

Escueta, M., Quan, V., Nickow, A. J., & Oreopoulos, P. (2017). *Education technology: An evidence-based review*. Retrieved from Cambridge, MA: https://www.nber.org/papers/w23744

Ferrari, L., Pease, S., Stier, G. R., & Schweitzer, M. (2018). Perioperative surgical home collaborative update. *ASA Monitor, 82*(1), 46-48.

Finkel, A. (2015). Why Canada has a universal medical insurance programme and the United States does not: Accounting for historical differences in American and Canadian social policies. In E. Dyck & C. Fletcher (Eds.), *Locating health - historical and anthropological investigations of place and health* (Vol. 2, pp. 71-88). London: Routledge.

Fleetwood, S. (2004). Critical realist applications in organisation and management studies. In S. Fleetwood & S. Ackroyd (Eds.), *The ontology of organisation and management studies* (Vol. 11). London: Routledge.

Flexner, A. (1908). *The American college: A criticism*. New York: Century Company.

Flexner, A. (1910). Medical education in the United States and Canada bulletin number four (The Flexner Report). *New York (NY): The Carnegie Foundation for the Advancement of Teaching*.

Flexner, A. (1912). *Medical education in Europe: A report to the Carnegie Foundation for the advancement of teaching*: Carnegie Foundation for the Advancement of Teaching.

Flynn, L., Jalali, A., & Moreau, K. A. (2015). Learning theory and its application to the use of social media in medical education. *Postgraduate Medical Journal*, postgradmedj-2015-133358.

Fogelson, N. S., Rubin, Z. A., & Ault, K. A. (2013). Beyond likes and tweets: An in-depth look at the physician social media landscape. *Clinical Obstetrics and Gynecology, 56*(3), 495-508.

Foot, K. A. (2014). Cultural-historical activity theory: Exploring a theory to inform practice and research. *Journal of Human Behavior in the Social Environment, 24*(3), 329-347.

Fox, R. D. (2012). Four pillars in the evolution of continuing medical education. In D. K. Wentz (Ed.), *Continuing medical education: Looking back, planning ahead* (pp. 193-201). U.S.: Dartmouth College Press.

Fox, S., & Aranko, O. (2017). Healthcare framing: Critical realist framing for causal interdependencies and uncertainties within healthcare. *Technology in Society, 50*, 66-72. doi:https://doi.org/10.1016/j.techsoc.2017.05.001

Gallup Polls. (2018). Responsibility for healthcare insurance *Healthcare System.* Retrieved from https://news.gallup.com/poll/4708/healthcare-system.aspx

Gallup Polls. (2019). *The U.S. Healthcare cost crisis -- public perceptions of the U.S. Healthcare system, the institutions that support it, and the burden and fear that it creates for the American people*. Retrieved from https://news.gallup.com/poll/248081/westhealth-gallup-us-healthcare-cost-crisis.aspx#ite-248093

Gambrill, E. (2012). *Critical thinking in clinical practice: Improving the quality of judgments and decisions* (3rd ed.). New Jersey, U.S.: John Wiley & Sons.

Garman, A. N., Leach, D. C., & Spector, N. (2006). Worldviews in collision: Conflict and collaboration across professional lines. *Journal of Organizational Behavior, 27*(7), 829-849. doi:10.1002/job.394

Gaugler, J., & Kane, R. L. (2015). *Family caregiving in the new normal*: Elsevier Science.

Gell-Mann, M. (1995). *The quark and the jaguar: Adventures in the simple and the complex*. New York: Henry Holt and Company.

George, S. (1999). *A short history of neoliberalism.* Paper presented at the Conference on Economic Sovereignty in a Globalising World, 24-26 March 1999, Bangkok.

Gerrits, L., & Verweij, S. (2013). Critical realism as a meta-framework for understanding the relationships between complexity and qualitative comparative analysis. *Journal of Critical Realism, 12*(2), 166-182.

Geyman, J. (2018). Crisis in U.S. Health care: Corporate power still blocks reform. *International Journal of Health Services, 48*(1), 5-27. doi:10.1177/0020731417729654

Ghorob, A., & Bodenheimer, T. (2012). Share the care™: Building teams in primary care practices. *The Journal of the American Board of Family Medicine, 25*(2), 143-145.

Gikas, J., & Grant, M. M. (2013). Mobile computing devices in higher education: Student perspectives on learning with cellphones, smartphones & social media. *The Internet and Higher Education, 19*, 18-26.

Gilens, M., & Page, B. I. (2014). Testing theories of American politics: Elites, interest groups, and average citizens. *Perspectives on Politics, 12*(3), 564-581. doi:10.1017/S1537592714001595

Given, L. M. (2017). It's a new year…so let's stop the paradigm wars. *International Journal of Qualitative Methods, 16*(1), 1609406917692647. doi:10.1177/1609406917692647

Gjerberg, E., & Kjølsrød, L. (2001). The doctor–nurse relationship: How easy is it to be a female doctor co-operating with a female nurse? *Social Science & Medicine, 52*(2), 189-202.

Glouberman, S., & Zimmerman, B. (2002). *Complicated and complex systems: What would successful reform of medicare look like?* Retrieved from http://publications.gc.ca/site/eng/235920/publication.html:

goarmy.com. (2018). Army pay chart and basic pay: Active duty soldiers. Retrieved from https://www.goarmy.com/benefits/money/basic-pay-active-duty-soldiers.html

Goldberg, D. G., Beeson, T., Kuzel, A. J., Love, L. E., & Carver, M. C. (2013). Team-based care: A critical element of primary care practice transformation. *Population Health Management, 16*(3), 150-156.

Goldenberg, M. J. (2006). On evidence and evidence-based medicine: Lessons from the philosophy of science. *Social science & medicine, 62*(11), 2621-2632.

Goldman, A. (2010). Epistemic relativism and reasonable disagreement. In R. Feldman & T. A. Warfield (Eds.), *Disagreement* (pp. 187-215). Oxford: Oxford university press. (Reprinted from: 2013).

Goodyear, P., Banks, S., Hodgson, V., & McConnell, D. (2004). *Advances in research on networked learning* (Vol. 4). Boston, U.S.: Springer Science & Business Media.

Gravenstein, J. S., & Steinhaus, J. E. (2003). The origin of the anesthesiologist assistant. *ASA NEWSLETTER, 67*(3), 5-7.

Green, M., Tariq, R., & Green, P. (2016). Improving patient safety through simulation training in anesthesiology: Where are we? *Anesthesiology Research and Practice, 2016*, 12. doi:10.1155/2016/4237523

Greene, J. A., & Loscalzo, J. (2017). Putting the patient back together-social medicine, network medicine, and the limits of reductionism. *The New England Journal of Medicine, 377*(25), 2493.

Greene, M. J. (2014). On the inside looking in: Methodological insights and challenges in conducting qualitative insider research. *The qualitative report, 19*(29), 1-13.

Greenhalgh, T., Howick, J., & Maskrey, N. (2014). Evidence based medicine: A movement in crisis? *British Medical Journal, 348*, g3725.

Greenhalgh, T., & Russell, J. (2009). Evidence-based policymaking: A critique. *Perspectives in Biology and Medicine, 52*(2), 304-318.

Grischkan, J., George, B. P., Chaiyachati, K., Friedman, A. B., Dorsey, E. R., & Asch, D. A. (2017). Distribution of medical education debt by specialty, 2010-2016. *JAMA internal medicine, 177*(10), 1532-1535.

Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. *Handbook of qualitative research, 2*(163-194), 105.

Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough? An experiment with data saturation and variability. *Field Methods, 18*(1), 59-82.

Guyatt, G. H. (1991). Evidence-based medicine. *ACP Journal Club, 114*(2), A16-A16.

Hager, M., Russell, S., & Fletcher, S. W. (2008). *Continuing education in the health professions: Improving healthcare through lifelong learning*. New York: Josiah Macy, Jr. Foundation.

Haidet, P., & Stein, H. F. (2006). The role of the student-teacher relationship in the formation of physicians. *Journal of General Internal Medicine, 21*(S1), S16-S20. doi:10.1111/j.1525-1497.2006.00304.x

Hansen, J., & Philp, E. (2014). State beat: 2014 state policy highlights. *American Society of Anesthesiologists, Newsletter, 78*(12).

Hardwig, J. (1991). The role of trust in knowledge. *The Journal of Philosophy, 88*(12), 693-708.

Harris, J. M., Sklar, B. M., Amend, R. W., & Novalis-Marine, C. (2010). The growth, characteristics, and future of online CME. *Journal of Continuing Education in the Health Professions, 30*(1), 3-10.

Hau, Y. S., Kim, B., Lee, H., & Kim, Y.-G. (2013). The effects of individual motivations and social capital on employees' tacit and explicit knowledge sharing intentions. *International Journal of Information Management, 33*(2), 356-366.

Hayes, J. C. (2012). Anesthesiologist-CRNA teamwork common, but groups at odds. *Medscape Anesthesiology.* Retrieved from https://www.medscape.com/viewarticle/761405

healthsystemtracker.org. (2017). Mortality rates have fallen steadily in the U.S. and in comparable OECD countries. *Peterson-Kaiser Health System Tracker.* Retrieved from http://www.healthsystemtracker.org/chart-collection/how-does-the-quality-of-the-u-s-healthcare-system-compare-to-other-countries/

Hean, S., Craddock, D., Hammick, M., & Hammick, M. (2012). Theoretical insights into interprofessional education: AMEE guide no. 62. *Medical Teacher, 34*(2), e78-e101.

Hean, S., Craddock, D., & O'Halloran, C. (2009). Learning theories and interprofessional education: A user's guide. *Learning in Health and Social Care, 8*(4), 250-262.

Heisenberg, W. (1971). *Physics and beyond: Encounters and conversations* (A. J. Pomerans, Trans.). New York, USA: Harper & Row.

Heng, H. H. (2008). The conflict between complex systems and reductionism. *JAMA, 300*(13), 1580-1581.

Heyes, M. E., Schnitzen, L., Starr, D. G., Vacchiano, C., Muckler, V. C., Thiemann, L., & Titch, J. F. (2018). Recertification and reentry to practice for nurse anesthetists: Determining core competencies and evaluating performance via high-fidelity simulation technology. *Journal of Nursing Regulation, 8*(4), 43-55.

Hibbard, J. H., & Greene, J. (2013). What The evidence shows about patient activation: Better health outcomes and care experiences; fewer data on costs. *Health Affairs, 32*(2), 207-214. doi:10.1377/hlthaff.2012.1061

Hinde, T., Gale, T., Anderson, I., Roberts, M., & Sice, P. (2016). A study to assess the influence of interprofessional point of care simulation training on safety culture in the operating theatre environment of a university teaching hospital. *Journal of Interprofessional Care*, 1-3.

Hlede, V. (2015). *Interprofessional learning: Anesthesiologists' perspectives*. Assignment, Doctoral Programme in E-Research and Technology Enhanced Learning. Department of Educational Research. Lancaster University.

Hoeck, B., & Delmar, C. (2018). Theoretical development in the context of nursing—The hidden epistemology of nursing theory. *Nursing Philosophy, 19*(1), e12196-n/a. doi:10.1111/nup.12196

Hoffman, J. R., Kanzaria, H. K., & Johnson, R. (2014). Intolerance of error and culture of blame drive medical excess. *British Medical Journal, 349*, g5702.

Holloway, I., & Galvin, K. (2016). *Qualitative research in nursing and healthcare* (4th ed.). Oxford, UK: John Wiley & Sons, 2016.

Holm, H. A. (1998). Quality issues in continuing medical education. *British Medical Journal, 316*(7131), 621-624. doi:10.1136/bmj.316.7131.621

Hovey, R. B., Rodríguez, C., Jordan, S., & Morck, A. (2016). Synergistic research in medical education: Some philosophical reflections. *Journal of Applied Hermeneutics*.

Hovlid, E., Bukve, O., Haug, K., Aslaksen, A. B., & von Plessen, C. (2012). Sustainability of healthcare improvement: What can we learn from learning theory? *BMC health services research, 12*(1), 235.

Huang, H. M. (2002). Toward constructivism for adult learners in online learning environments. *British Journal of Educational Technology, 33*(1), 27-37.

Iivari, J., & Linger, H. (1999). *Knowledge work as collaborative work: A situated activity theory view.* Paper presented at the 32nd Annual Hawaii International Conference onS ystems Sciences, HICSS-32.

IoM, Institute of Medicine. (1972). *Educating for the health team*. Retrieved from Washington, D.C.: https://nexusipe.org/informing/resource-center/iom-1972-report-educating-health-team

IoM, Institute of Medicine. (2003). *Health professions education: A bridge to quality* (E. Knebel & A. C. Greiner Eds.): National Academies Press.

IoM, Institute of Medicine. (2007). *The learning healthcare system: Workshop summary*. Washington , D.C.: National Academies Press, National Academy of Sciences.

IoM, Institute of Medicine. (2009). *Conflict of interest in medical research, education, and practice* (M. J. Field & B. Lo Eds.). 500 Fifth Street, N.W. Washington, DC 20001: National Academies Press.

IoM, Institute of Medicine. (2010). *Redesigning continuing education in the health professions* (9780309140782). Retrieved from http://www.ama-assn.org/resources/doc/cme/iom-report-cme.pdf

IoM, Institute of Medicine. (2011). *Digital infrastructure for the learning health system: The foundation for continuous improvement in health and health care: Workshop series summary* (J. M. McGinnis, B. Powers, & C. Grossmann Eds.). Washington, DC: National Academies Press.

IoM, Institute of Medicine. (2012). *Engineering a learning healthcare system - a look at the future*. Retrieved from https://www.ncbi.nlm.nih.gov/books/NBK61957/

IoM, Institute of Medicine. (2013a). *Best care at lower cost: The path to continuously learning health care in America*: Institute of Medicine, National Academies Press.

IoM, Institute of Medicine. (2013b). *Interprofessional education for collaboration: Learning how to improve health from interprofessional models across the continuum of education to practice: Workshop summary*: National Academies Press.

IoM, Institute of Medicine. (2013c). *U.S. Health in international perspective: Shorter lives, poorer health*. Washington, D.C.: National Academies Press.

IoM, Institute of Medicine. (2015). *Measuring the impact of interprofessional education on collaborative practice and patient outcomes* (978-0-309-37282-4). Retrieved from Washington, D.C.: https://www.iom.edu/Reports/2015/Impact-of-IPE.aspx

Irons, M. B., & Nora, L. M. (2015). Maintenance of certification 2.0—strong start, continued evolution. *New England Journal of Medicine, 372*(2), 104-106.

Isaksen, R. (2016). Reclaiming rational theory choice as central: A critique of methodological applications of critical realism. *Journal of Critical Realism, 15*(3), 245-262.

Jackson, D., & Temperley, J. (2007). From professional learning community to networked learning community. In K. S. L. Louise Stoll (Ed.), *Professional learning communities: Divergence, depth and dilemmas* (pp. 45-62). UK: McGraw-Hill Education.

Jacobs-Halsey, G., & Davis, D. A. (2017). Designing and delivering effective continuing education activities. In W. F. Rayburn, D. A. Davis, & M. G. Turco (Eds.), *Continuing professional development in medicine and health care: Better education, better patient outcomes*. Philadelphia, US: Lippincott Williams & Wilkins.

Jacobs, L., & Skocpol, T. (2015). *Health care reform and American politics: What everyone needs to know* (3 ed.). New York, NY, U.S.: Oxford University Press.

James, J. T. (2013). A new, evidence-based estimate of patient harms associated with hospital care. *Journal of Patient Safety, 9*(3), 122-128 110.1097/PTS.1090b1013e3182948a3182969.

Jandrić, P., Knox, J., Besley, T., Ryberg, T., Suoranta, J., & Hayes, S. (2018). Postdigital science and education. *Educational Philosophy and Theory, 50*(10), 893-899. doi:10.1080/00131857.2018.1454000

Joffe, H. (2012). Thematic analysis. In D. Harper & A. R. Thompson (Eds.), *Qualitative research methods in mental health and psychotherapy: A guide for students and practitioners* (Vol. 1, pp. 210-223): John Wiley & Sons.

Johnston, J., & Dornan, T. (2015). Activity theory: Mediating research in medical education. In J. Cleland & S. J. Durning (Eds.), *Researching medical education* (pp. 93-104). The Association for the Study of Medical Education: John Wiley & Sons.

Johnstone, R. E. (2015, 4/10/2015). ASA membership: Some say no. *Anesthesiology News*. Retrieved from http://www.anesthesiologynews.com/ViewArticle.aspx?d=Commentary&d_id=449&i=April+2015&i_id=1168&a_id=30903

jointaccreditation.org. (2018). Joint accreditation for interprofessional continuing education - at a glance. Retrieved from http://www.jointaccreditation.org/glance

Jonassen, D. H., & Land, S. (2012). *Theoretical foundations of learning environments* (Vol. 2). New York, NY 10017: Routledge.

Jonassen, D. H., & Rohrer-Murphy, L. (1999). Activity theory as a framework for designing constructivist learning environments. *Educational Technology Research and Development, 47*(1), 61-79.

Jordan, M. E., & Mcdaniel, R. R. (2014). Helping students respond creatively to a complex world. In D. Ambrose, B. Sriraman, & K. M. Pierce (Eds.), *A critique of creativity and complexity* (pp. 249-268). 3001 AW Rotterdam, The Netherlands: Springer.

Josseran, L., & Chaperon, J. (2001). History of continuing medical education in the United States. *Presse medicale (Paris, France: 1983), 30*(10), 493-497.

Kaba, R., & Sooriakumaran, P. (2007). The evolution of the doctor-patient relationship. *International Journal of Surgery, 5*(1), 57-65.

Kahneman, D. (2011). *Thinking, fast and slow*. Farrar, Sraus and Giroux, 18 West 18th Street, New York, NY, U.S.: Macmillan.

Kain, Z., Hwang, J., & Warner, M. (2015). Disruptive innovation and the specialty of anesthesiology: The case for the perioperative surgical home. *Anesthesia & Analgesia, 120*(5), 1155-1157.

Kain, Z., Vakharia, S., Garson, L., Engwall, S., Schwarzkopf, R., Gupta, R., & Cannesson, M. (2014). The perioperative surgical home as a future perioperative practice model. *Anesthesia & Analgesia, 118*(5), 1126-1130. doi:10.1213/ane.0000000000000190

Kane, M., & Smith, A. (2004). An American tale–professional conflicts in anaesthesia in the United States: Implications for the United Kingdom. *Anaesthesia, 59*(8), 793-802.

Kaplan, H. C., Provost, L. P., Froehle, C. M., & Margolis, P. A. (2012). The model for understanding success in quality (MUSIQ): Building a theory of context in healthcare quality improvement. *BMJ Quality & Safety, 21*(1), 13-20.

Karle, H., Paulos, G., & Wentz, D. K. (2012). Continuing professional development: Concept, origins, and rationale. In D. K. Wentz (Ed.), *Continuing medical*

education: Looking back, planning ahead (pp. 281-289). Hanover, NH, US and London: Dartmouth College Press.

Kauffman, S. A. (1993). *The origins of order: Self-organization and selection in evolution*. New York: Oxford University Press, U.S.

Kegan, R., & Lahey, L. L. (2009). *Immunity to change: How to overcome it and unlock potential in yourself and your organization*: Harvard Business Press.

Kelly, K. e. (1994). *Out of control: The new biology of machines, social systems, and The economic world*. U.S.and Canada: Basic Books.

Kempen, P. M. (2012). Maintenance of certification (MOC), and now maintenance of licensure (MOL): Wrong methodologies to improve medical care. *Journal of American Physicians and Surgeons, 17*(1), 12-14.

Kempster, S., & Parry, K. W. (2011). Grounded theory and leadership research: A critical realist perspective. *The Leadership Quarterly, 22*(1), 106-120.

Kerosuo, H., Kajamaa, A., & Engeström, Y. (2010). Promoting innovation and learning through change laboratory: An example from finnish health care. *Central European Journal of Public Policy, 4*(1), 110-131.

Keshavarz, N., Nutbeam, D., Rowling, L., & Khavarpour, F. (2010). Schools as social complex adaptive systems: A new way to understand the challenges of introducing the health promoting schools concept. *Social Science & Medicine, 70*(10), 1467-1474.

Kessler, G. (2015, April 1, 2015). Obama's claim the affordable care act was a 'major reason' in preventing 50,000 patient deaths. *Fact Checker.* Retrieved from https://www.washingtonpost.com/news/fact-checker/wp/2015/04/01/obamas-claim-the-affordable-care-act-was-a-major-reason-in-preventing-50000-patient-deaths/

Kim, R. M., & Kaplan, S. M. (2011). *Toward a synthesis of complex adaptive systems and actor-network theory.* Paper presented at the ACIS 2011 Proceedings-22nd Australasian Conference on Information Systems.

Kitson, A., Brook, A., Harvey, G., Jordan, Z., Marshall, R., O'Shea, R., & Wilson, D. (2017). Using complexity and network concepts to inform healthcare knowledge translation. *International Journal of Health Policy and Management, 6*.

Kitto, S., Goldman, J., Etchells, E., Silver, I., Peller, J., Sargeant, J., . . . Bell, M. (2015). Quality improvement, patient safety, and continuing education: A qualitative study of the current boundaries and opportunities for collaboration between these domains. *Academic Medicine*.

Klein, J. H., & Young, T. (2015). Health care: A case of hypercomplexity? *Health Systems, 4*(2), 104-110.

Klette, K. (2012). *The role of theory in educational research - report from the march seminar 2011*. Retrieved from Oslo, Norway: https://www.forskningsradet.no/servlet/Satellite?cid=1253979441594&pagename=VedleggPointer&target=_blank

Knoll, A. H. (2011). The multiple origins of complex multicellularity. *Annual Review of Earth and Planetary Sciences, 39*, 217-239.

Knoll, B. R., & Shewmaker, J. (2015). "Simply un-American": Nativism and support for health care reform. *Political Behavior, 37*(1), 87-108. doi:10.1007/s11109-013-9263-z

Knowles, M. S., Holton, E. F., & Swanson, R. A. (2005). *The adult learner: The definitive classic in adult education and human resource development*: Elsevier.

Koch, S. (2013). Achieving holistic health for the individual through person-centered collaborative care supported by informatics. *Healthcare Informatics Research, 19*(1), 3-8.

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development* (Vol. 1). Englewood Cliffs, NJ, US: Prentice-Hall.

Kop, R. (2008). Web 2.0 technologies: Disruptive or liberating for adult education?

Kupres, D., & Pašić, D. (2007). E-learning in Croatia. *Vadyba/Journal of Management 3-4* (16-17), 63-66.

Kusch, M. (2004). *Knowledge by agreement: The programme of communitarian epistemology*. New York, U.S.: Clarendon Press.

Kuutti, K. (1996). Activity theory as a potential framework for human-computer interaction research. In B. A. Nardi (Ed.), *Context and consciousness: Activity theory and human-computer interaction* (Vol. 17, pp. 400). U.S.: MIT Press.

Ladden, M. D., Bednash, G., Stevens, D. P., & Moore, G. T. (2009). Educating interprofessional learners for quality, safety and systems improvement. *Journal of Interprofessional Care*.

LaDonna, K. A., Bates, J., Tait, G. R., McDougall, A., Schulz, V., & Lingard, L. (2017). 'Who is on your health-care team?' Asking individuals with heart failure about care team membership and roles. *Health Expectations, 20*(2), 198-210. doi:10.1111/hex.12447

Lambrew, J. M. (2018). Getting ready for health reform 2020: What past presidential campaigns can teach us. *Commonwealth Fund, June, 26*.

Larson, M. S. (1979). *The rise of professionalism: A sociological analysis* (Vol. 233). U.S.: Univ. of California Press.

Lassmann, B., & Cornaglia, G. (2017). Place of international congresses in the diffusion of knowledge in infectious diseases. *Clinical Infectious Diseases, 65*, S70.

Lawson, A. E., & Daniel, E. S. (2011). Inferences of clinical diagnostic reasoning and diagnostic error. *Journal of Biomedical Informatics, 44*(3), 402-412. doi:https://doi.org/10.1016/j.jbi.2010.01.003

Leape, L. L. (2002). Reporting of adverse events. *The New England Journal of Medicine, 347*(20), 1633.

Leonard, M., Graham, S., & Bonacum, D. (2004). The human factor: The critical importance of effective teamwork and communication in providing safe care. *Quality and Safety in Health Care, 13*(suppl 1), i85-i90.

Lepkowski, E. A., & Higgins, M. G. (2015). Enhancing education delivery for members and their care teams – The next generation ASA education center. *ASA Monitor, 79*(10), 24-27.

Leung, A., Kier, C., Fung, T., Fung, L., & Sproule, R. (2013). Searching for happiness: The importance of social capital. In *The exploration of happiness* (pp. 247-267): Springer.

Leung, K. H., Pluye, P., Grad, R., & Weston, C. (2010). A reflective learning framework to evaluate CME effects on practice reflection. *Journal of Continuing Education in the Health Professions, 30*(2), 78-88. doi:10.1002/chp.20063

Levitt, T. (1960). Marketing myopia. *Harvard Business Review, 38*(4), 24-47.

Liaw, S. Y., Siau, C., Zhou, W. T., & Lau, T. C. (2014). Interprofessional simulation-based education program: A promising approach for changing stereotypes and improving attitudes toward nurse–physician collaboration. *Applied Nursing Research, 27*(4), 258-260.

Lin, S. Y., Schillinger, E., & Irby, D. M. (2014). Value-added medical education: Engaging future doctors to transform health care delivery today. *Journal of General Internal Medicine, 30*(2), 150-151.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. U.S.: SAGE Publications.

Ljungqvist, O. (2017). Improving surgery by talking to each other [video file: Https://youtu.Be/bnzrjo1op0y]. *TEDxBeaconStreet.* Retrieved from https://tedxbeaconstreet.com/videos/from-hospital-to-home-in-less-time-introducing-eras-the-next-revolution-in-surgery/

Long, K. M., McDermott, F., & Meadows, G. N. (2018). Being pragmatic about healthcare complexity: Our experiences applying complexity theory and pragmatism to health services research. *BMC Medicine, 16*(1), 94. doi:10.1186/s12916-018-1087-6

Looft, W. R. (1972). Egocentrism and social interaction across the life span. *Psychological Bulletin, 78*(2), 73-92. doi:10.1037/h0033012

Lorello, G. R., Cook, D. A., Johnson, R. L., & Brydges, R. (2014). Simulation-based training in anaesthesiology: A systematic review and meta-analysis. *British Journal of Anaesthesia, 112*(2), 231-245. doi:10.1093/bja/aet414

Maccoby, M., Norman, C. L., Norman, C. J., & Margolies, R. (2013). *Transforming health care leadership: A systems guide to improve patient care, decrease costs, and improve population health*: John Wiley & Sons.

Mackey, D. C., & Schweitzer, M. P. (2014). The future of surgical care in the U.S.: State surgical quality collaboratives, optimized perioperative care, and the perioperative surgical home. *American Society of Anesthesiologists, Newsletter, Volume 78, Number 12*, 10-13.

Macy, Josiah Macy Jr. Foundation. (2013a). *Transforming patient care: Aligning interprofessional education with clinical practice redesign.* Paper presented at the Macy Conference on Transforming Patient Care: Aligning Interprofessional Education with Clinical Practice Redesign, January 2013.

Macy, Josiah Macy Jr. Foundation. (2013b). *Transforming patient care: Aligning interprofessional education with clinical practice redesign.* Paper presented at the Macy Conference on Transforming Patient Care: Aligning Interprofessional Education with Clinical Practice Redesign, January 2013.

Mahoney, J., & Goertz, G. (2006). A tale of two cultures: Contrasting quantitative and qualitative research. *Political Analysis, 14*(3), 227-249.

Makary, M. A., & Daniel, M. (2016). Medical error—the third leading cause of death in the US. *British Medical Journal, 353*. doi:10.1136/bmj.i2139

Makovsky Health. (2013, Sept. 9, 2013). Online health research eclipsing patient-doctor conversations. Retrieved from http://www.makovsky.com/insights/articles/25-insights/articles/article/229-as-the-web-goes-mobile-healthcare-stands-still

Malterud, K. (1995). The legitimacy of clinical knowledge: Towards a medical epistemology embracing the art of medicine. *Theoretical Medicine, 16*(2), 183-198. doi:10.1007/bf00998544

Manchikanti, L., & Hirsch, J. A. (2012). Obamacare 2012: Prognosis unclear for interventional pain management. *Pain physician, 15*(5), E629-E640.

Mann, K., Gordon, J., & MacLeod, A. (2007). Reflection and reflective practice in health professions education: A systematic review. *Advances in Health Sciences Education, 14*(4), 595. doi:10.1007/s10459-007-9090-2

Mann, K. V. (2004). The role of educational theory in continuing medical education: Has it helped us? *Journal of Continuing Education in the Health Professions, 24*(S1).

Margolis, A., & Parboosingh, J. (2015). Networked learning and network science: Potential applications to health professionals' continuing education and development. *Journal of Continuing Education in the Health Professions, 35*(3), 211-219.

Martin, A. B., Hartman, M., Washington, B., Catlin, A., & The National Health Expenditure Accounts Team. (2018). National health care spending in 2017: Growth slows to post–great recession rates; share of gdp stabilizes. *Health Affairs, 38*(1), 10.1377/hlthaff.2018.05085. doi:10.1377/hlthaff.2018.05085

Marton, F. (1981). Phenomenography — describing conceptions of the world around us. *Instructional science, 10*(2), 177-200.

Marton, F. (1986). Phenomenography—a research approach to investigating different understandings of reality. *Journal of Thought, 21*(3), 28-49.

Marton, F. (2000). The structure of awareness. *Phenomenography*, 102-116.

Marton, F., & Booth, S. (1997). *Learning and awareness*. Mahwah, NJ, US: Routledge.

Marvasti, F. F., & Stafford, R. S. (2012). From sick care to health care—reengineering prevention into the US system. *New England Journal of Medicine, 367*(10), 889-891.

Marx, K. (1993). *Grundrisse: Foundations of the critique of political economy*: Penguin.

Marx, K. (2002). Theses on Feuerbach. from Marx/Engels Internet Archive

Matsusaki, T., & Sakai, T. (2011). The role of certified registered nurse anesthetists in the United States. *Journal of Anesthesia, 25*(5), 734-740. doi:10.1007/s00540-011-1193-5

mayoclinic.org. (2018). About MCSMN. *Mayo Clinic Social Media Network.* Retrieved from http://socialmedia.mayoclinic.org/about-mcsmn/

McCrae, N. (2012). Whither nursing models? The value of nursing theory in the context of evidence-based practice and multidisciplinary health care. *Journal of Advanced Nursing, 68*(1), 222-229. doi:doi:10.1111/j.1365-2648.2011.05821.x

McDonald, K. M., Graham, I. D., & Grimshaw, J. (2004). Toward a theoretic basis for quality improvement interventions. In K. G. Shojania, K. M. McDonald, R. M. Wachter, & D. K. Owens (Eds.), *Closing the quality gap: A critical analysis of quality improvement strategies, volume 1—series overview and methodology* (pp. 48): Agency for Healthcare Research and Quality, U.S. Department of Health and Human Services, 540 Gaither Road, Rockville, MD 20850, www.ahrq.gov.

McIvor, W., Burden, A., Weinger, M. B., & Steadman, R. (2012). Simulation for maintenance of certification in anesthesiology: The first two years. *Journal of Continuing Education in the Health Professions, 32*(4), 236-142. doi:doi:10.1002/chp.21151

McMahon, G. T. (2016). What do I need to learn today? — The evolution of CME. *New England Journal of Medicine, 374*(15), 1403-1406.

McMahon, G. T. (2017). Advancing CME and CPD; evolution, innovation, accreditation, and alignment. In W. F. Rayburn, D. A. Davis, & M. G. Turco (Eds.), *Continuing professional development in medicine and health care: Better education, better patient outcomes* (pp. 259-270). Philadelphia, U.S.: Lippincott Williams & Wilkins.

McMahon, G. T., Aboulsoud, S., Gordon, J., McKenna, M., Meuser, J., Staz, M., & Campbell, C. M. (2016). Evolving alignment in international continuing professional development accreditation. *Journal of Continuing Education in the Health Professions, 36*, S22-S26.

McMahon, G. T., & Skochelak, S. E. (2018). Evolution of continuing medical education: Promoting innovation through regulatory alignment. *JAMA, 319*(6), 545-546.

McMeen, G. R. (1986). The impact of technological change on education. *Educational Technology, 26*(2), 42-45.

McMillan, W. (2015). Theory in healthcare education research: The importance of worldview. In J. Cleland & S. J. Durning (Eds.), *Researching medical education* (pp. 15-24). Chichester, U.S.: John Wiley & Sons.

McWilliams, J. (2017). MACRA: Big fix or big problem? *Annals of Internal Medicine, 167*(2), 122-124. doi:10.7326/M17-0230

Meadows, D. (2002). Dancing with systems. *The Systems Thinker, 13*, 2-6.

Meese, K. A., & Borkowski, N. M. (2017). It takes a village to deliver effective and efficient care: Team-based performance. *Anesthesia & Analgesia, 124*(5), 1717-1720. doi:10.1213/ane.0000000000001980

Mehta, N. B., Hull, A. L., Young, J. B., & Stoller, J. K. (2013). Just imagine: New paradigms for medical education. *Academic Medicine, 88*(10), 1418-1423 1410.1097/ACM.1410b1013e3182a1436a1407.

Meleis, A. I. (2016). Interprofessional education: A summary of reports and barriers to recommendations. *48*(1), 106-112. doi:doi:10.1111/jnu.12184

Mercer, J. (2007). The challenges of insider research in educational institutions: Wielding a double-edged sword and resolving delicate dilemmas. *Oxford Review of Education, 33*(1), 1-17.

Merry, A. F., Weller, J., & Mitchell, S. J. (2014). Teamwork, communication, formula-one racing and the outcomes of cardiac surgery. *The Journal of Extra-corporeal Technology, 46*(1), 7-14.

Mezzich, J., Snaedal, J., Van Weel, C., & Heath, I. (2010). Toward person-centered medicine: From disease to patient to person. *Mount Sinai Journal of Medicine: A Journal of Translational and Personalized Medicine, 77*(3), 304-306.

Michod, R. E. (2007). Evolution of individuality during the transition from unicellular to multicellular life. *Proceedings of the National Academy of Sciences, 104*(suppl 1), 8613-8618.

Miles, A., & Asbridge, J. (2013). Contextualizing science in the aftermath of the evidence-based medicine era: On the need for person-centered healthcare. *European Journal for Person Centered Healthcare, 1*(2), 285-289.

Miles, A., & Asbridge, J. (2017). Person-centered healthcare-moving from rhetoric to methods, through implementation to outcomes. *European Journal for Person Centered Healthcare, 5*(1), 1-9.

Miller, R. (2000). Beyond reductionism: The emerging holistic paradigm in education. *The Humanistic Psychologist, 28*(1-3), 382.

Milstein, R., & Schreyoegg, J. (2016). Pay for performance in the inpatient sector: A review of 34 p4p programs in 14 OECD countries. *Health Policy, 120*(10), 1125-1140. doi:https://doi.org/10.1016/j.healthpol.2016.08.009

Mingers, J. (2004). Re-establishing the real: Critical realism and information systems. In J. Mingers & L. P. Willcocks (Eds.), *Social theory and philosophy for information systems* (Vol. 372, pp. 406). Chichester, England: Wiley.

Mingers, J. (2014). *Systems thinking, critical realism and philosophy: A confluence of ideas*. New York, NY: Routledge.

Miriam, B. (2018). Re-conceptualizing the nursing metaparadigm: Articulating the philosophical ontology of the nursing discipline that orients inquiry and practice. *Nursing Inquiry, 0*(0), e12243. doi:doi:10.1111/nin.12243

Molleman, E., & Rink, F. (2015). The antecedents and consequences of a strong professional identity among medical specialists. *Social Theory & Health, 13*(1), 46-61.

Moore, B., & Tonniges, T. F. (2004). The “every child deserves a medical home” training program: More than a traditional continuing medical education course. *Pediatrics, 113*(Supplement 4), 1479-1484.

Moore, D. E., Bennett, N., & Mann, K. V. (2012). Research in continuing medical education. In D. K. Wentz (Ed.), *Continuing medical education: Looking back, planning ahead* (pp. 177-187). Hanover, N.H., U.S .and London: Dartmouth College Press.

Moore, D. E., Green, J. S., & Gallis, H. A. (2009). Achieving desired results and improved outcomes: Integrating planning and assessment throughout learning activities. *Journal of Continuing Education in the Health Professions, 29*(1), 1-15.

Morozov, E. (2013). *To save everything, click here: The folly of technological solutionism*: Public Affairs.

Morrow, S. L. (2005). Quality and trustworthiness in qualitative research in counseling psychology. *Journal of Counseling Psychology, 52*(2), 250-260.

Moses, R. E., McNeese, L. G., Feld, L. D., & Feld, A. D. (2014). Social media in the health-care setting: Benefits but also a minefield of compliance and other legal issues. *The American Journal of Gastroenterology, 109*(8), 1128-1132.

MoteOo. (2018). Blind men, burmese elephant story. In blind-men-1421406 (Ed.), *pixabay.com* (Vol. 2912×1900). pixabay.com.

Nairn, S. (2012). A critical realist approach to knowledge: Implications for evidence-based practice in and beyond nursing. *Nursing Inquiry, 19*(1), 6-17. doi:doi:10.1111/j.1440-1800.2011.00566.x

Nardi, B. A. (1996). Activity theory and human-computer interaction. In B. A. Nardi (Ed.), *Context and consciousness: Activity theory and human-computer interaction* (Vol. 436, pp. 7-16). U.S.: MIT Press.

Navedo, A., Pawlowski, J., & Cooper, J. B. (2015). Multidisciplinary and interprofessional simulation in anesthesia. *International Anesthesiology Clinics, 53*(4), 115-133.

Nevis, E. C., DiBella, A. J., & Gould, J. M. (2000). Understanding organizations as learning systems. In *Knowledge, groupware and the internet* (pp. 43-63): Elsevier.

Nichols, D. G. (2017). Maintenance of certification and the challenge of professionalism. *Pediatrics*. doi:10.1542/peds.2016-4371

Norman, A.-C. (2013). *The implicit or explicit character of negotiation: How quality improvements are discussed in communities of practicein health care.* Paper presented at the Microsystems in Healthcare-a scientific perspective 2013.

Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic analysis: Striving to meet the trustworthiness criteria. *International Journal of Qualitative Methods, 16*(1), 1609406917733847. doi:10.1177/1609406917733847

Nunez, I. (2012). *Critical realist activity theory (CRAT).* Institute of Education, University of London,

O'Farrill, T. R. (2008). *Conceptions of effective information use and learning in a tele-health organization: A phenomenographic study of information literacy and knowledge management at work.* (PhD), Robert Gordon University,

O'Doherty, D., Dromey, M., Lougheed, J., Hannigan, A., Last, J., & McGrath, D. (2018). Barriers and solutions to online learning in medical education – an integrative review. *BMC Medical Education, 18*(1), 130. doi:10.1186/s12909-018-1240-0

O'Mahoney, J., & Vincent, S. (2014). Critical realism as an empirical project: A beginner's guide. In P. K. Edwards, J. O'Mahoney, & S. Vincent (Eds.), *Studying organizations using critical realism: A practical guide* (Vol. 1, pp. 1 - 21). 198 Madison Avenue, New York, NY 10016, U.S.: Oxford University Press ,Great Clarendon Street, Oxford, OX2 6DP, UK.

Ogrinc, G., & Batalden, P. (2009). Realist evaluation as a framework for the assessment of teaching about the improvement of care. *Journal of Nursing Education, 48*(12), 661-667.

Olenick, M., Allen, L. R., & Smego, R. A. (2010). Interprofessional education: A concept analysis. *Advances in Medical Education and Practice, 1*, 75-84. doi:10.2147/AMEP.S13207

Olson, C. A. (2012). Twenty predictions for the future of CPD: Implications of the shift from the update model to improving clinical practice. *J Contin Educ Health Prof, 32*(3), 151-152. doi:10.1002/chp.21139

Olson, C. A. (2013). Reflections on using theory in research on continuing education in the health professions. *Journal of Continuing Education in the Health Professions, 33*(3), 151-152. doi:10.1002/chp.21178

Paige, J. T., Garbee, D. D., Kozmenko, V., Yu, Q., Kozmenko, L., Yang, T., . . . Swartz, W. (2014). Getting a head start: High-fidelity, simulation-based operating room team training of interprofessional students. *Journal of the American College of Surgeons, 218*(1), 140-149.

Papanicolas, I., Woskie, L. R., & Jha, A. K. (2018). Health care spending in the united states and other high-income countries. *JAMA, 319*(10), 1024-1039. doi:10.1001/jama.2018.1150

Parse, R. R. (2004). A human becoming teaching-learning model. *Nursing Science Quarterly, 17*(1), 33-35.

Patel, V. L., Arocha, J. F., & Zhang, J. (2012). Medical reasoning and thinking. In K. J. Holyoak & R. G. Morrison (Eds.), *The Oxford handbook of thinking and reasoning* (Illustrated ed., pp. 736-754): OUP USA, 2012.

Patterson, M., Geis, G., LeMaster, T., & Wears, R. (2013). Impact of multidisciplinary simulation-based training on patient safety in a paediatric emergency department. *BMJ Quality & Safety, 22*, 383 - 393.

Pawson, R., Greenhalgh, T., Harvey, G., & Walshe, K. (2004). Realist synthesis: An introduction. *Manchester: ESRC Research Methods Programme, University of Manchester*.

Pearl, R. (2017). Healthcare's dangerous fee-for-service addiction. *Forbes >> Pharma & Healthcare #PublicHealth.* Retrieved from https://www.forbes.com/sites/robertpearl/2017/09/25/fee-for-service-addiction/2/#664cec4358e6

Peters, O. (2002). *Distance education in transition: New trends and challenges*: BIS Verlag.

Pilgrim, D. (2013). The failure of diagnostic psychiatry and some prospects of scientific progress offered by critical realism. *Journal of Critical Realism, 12*(3), 336-358. doi:10.1179/1476743013Z.0000000004

Playle, J. F. (1995). Humanism and positivism in nursing: Contradictions and conflicts. *Journal of Advanced Nursing, 22*(5), 979-984.

Plsek, P. E., & Wilson, T. (2001). Complexity, leadership, and management in healthcare organisations. *British Medical Journal, 323*(7315), 746.

Poli, R. (2013). A note on the difference between complicated and complex social systems. *Cadmus Journal, 2*(1), 142.

Porter, M. E., & Lee, T. H. (2013a). The strategy that will fix health care. *Harvard Business Review, 91*(10), 1-19.

Porter, M. E., & Lee, T. H. (2013b). Why health care is stuck—and how to fix it. *Harvard Business Review*.

Prensky, M. (2005). Listen to the natives. *Educational Leadership 64*(4), 8-13.

Price, D., Havens, C., & Bell, M. J. (2012). Continuing professional development and improvement to meet current and future continuing medical education needs of physicians. In D. K. Wentz (Ed.), *Continuing medical education: Looking back, planning ahead* (pp. 1-14). Hanover, N.H., U.S., and London: Dartmouth College Press.

Price, S. H. (1989). The sinking of the “captain of the ship”: Reexamining the vicarious liability of an operating surgeon for the negligence of assisting hospital personnel. *Journal of Legal Medicine, 10*(2), 323-356. doi:10.1080/01947648909513575

Radcliffe, N. J. (2010). Nested venn diagrams. In. Edinburgh, UK: Stochastic Solutions Limited & Department of Mathematics and Statistics, University of Edinburgh.

Ranmuthugala, G., Plumb, J., Cunningham, F., Georgiou, A., Westbrook, J., & Braithwaite, J. (2011). How and why are communities of practice established in the healthcare sector? A systematic review of the literature. *BMC Health Services Research, 11*(1), 273.

Rashotte, J., & Carnevale, F. A. (2004). Medical and nursing clinical decision making: A comparative epistemological analysis. *Nursing Philosophy, 5*(2), 160-174.

Rasmus, J. (2006). *The war at home: The corporate offensive from Ronald Reagan to George W. Bush : Economic class war in America*: Kyklos Productions.

Rastegar, D. A. (2004). Health care becomes an industry. *Annals of Family Medicine, 2*(1), 79-83. doi:10.1370/afm.18

Rayburn, W. F., Davis, D. A., & Turco, M. G. (2017). *Continuing professional development in medicine and health care: Better education, better patient outcomes*: Lippincott Williams & Wilkins.

Reeves, S., & van Schaik, S. (2012). Simulation: A panacea for interprofessional learning? *Journal of Interprofessional Care, 26*(3), 167-169. doi:10.3109/13561820.2012.678183

Reiling, R. B. (2016). Surgeon's responsibility for patient care. *JAMA Surgery, 151*(11), 1091-1092. doi:10.1001/jamasurg.2016.2354

Rice, T., Unruh, L. Y., van Ginneken, E., Rosenau, P., & Barnes, A. J. (2018). Universal coverage reforms in the USA: From Obamacare through trump. *Health Policy, 122*(7), 698-702.

Riches, D. (2000). The holistic person; or, the ideology of egalitarianism. *Journal of the Royal Anthropological Institute, 6*(4), 669-685.

Riva, F., Triscoli, C., Lamm, C., Carnaghi, A., & Silani, G. (2016). Emotional egocentricity bias across the life-span. *8*(74). doi:10.3389/fnagi.2016.00074

Roberts, C., & Thomson, S. B. (1994). Our quality program isn't working. In P. M. Senge (Ed.), *The fifth discipline fieldbook: Strategies and tools for building a learning organization*. U.S.: Doubleday.

Roberts, L. (2015). Revalidation: Implications for Australian anaesthetists. *Anaesthesia & Intensive Care, 43*(5).

Robertson, J., & Bandali, K. (2008). Bridging the gap: Enhancing interprofessional education using simulation. *Journal of Interprofessional Care, 22*(5), 499-508.

Robson, R. (2015). *Complex adaptive systems - can CAS principles inform simulation-based healthcare education?* Paper presented at the Society for Education in Anesthesia, Annual Meeting 2015: Collaborative Education In An Ever-Changing World, Seattle, WA.

Rose, A. M. (1998). *Human behavior and social processes: An interactionist approach*. Milton Park Abingdon Oxfordshire OX14 4RW, UK: Routledge, Houghton Mifflin Company.

Rosner, M. H. (2018). Maintenance of certification: Framing the dialogue. *Clinical Journal of the American Society of Nephrology, 13*(1), 161-163. doi:10.2215/cjn.07950717

Ross, B. K., & Metzner, J. (2015). Simulation for maintenance of certification. *Surgical Clinics, 95*(4), 893-905. doi:10.1016/j.suc.2015.04.010

Roviner, J. (2016). Teaching medical teamwork right from The start. *Shots - Health News from NPR.* Retrieved from http://www.npr.org/templates/transcript/transcript.php?storyId=488811721

Russell, B., Maher, G., Prochaska, J. O., & Johnson, S. S. (2012). Strategic approaches to continuing medical education: Applying the transtheoretical model & diffusion of innovation theory. *CE Measure, 6*(3), 27-31.

Ryan, P. (2017). House speaker Paul Ryan: 'No doubt' Republican health care plan will pass. In. https://abcnews.go.com/Politics/video/house-speaker-paul-ryan-doubt-republican-health-care-45999958.

Rysiew, P. (2016). Epistemic contextualism. In E. N. Zalta (Ed.), *Stanford Encyclopedia of Philosophy*. Stanford, CA: The Metaphysics Research Lab.

Sala, J. E. (2017). The jibarization of logos: How medical reductionism can kill. *Boletín Médico Del Hospital Infantil de México (English Edition), 74*(2), 154-163. doi:https://doi.org/10.1016/j.bmhime.2017.11.021

Salomon, G. (2016). It's not just the tool but the educational rationale that counts. In E. Elstad (Ed.), *Educational technology and polycontextual bridging* (pp. 149-161). Rotterdam: Sense Publishers.

Sayer, A. (2010). *Method in social science: Revised 2nd edition*: Routledge.

Schmitt, M. H., Baldwin, D. C., & Reeves, S. (2012). Continuing interprofessional education; collaborative learning for collaborative practice. In D. K. Wentz (Ed.), *Continuing medical education: Looking back, planning ahead* (pp. 281-289). Hanover, NH, U.S. and London: Dartmouth College Press.

Schneider, E. C., Sarnak, D. O., Squires, D., Shah, A., & Doty, M. M. (2017). *Mirror mirror 2017: International comparison reflects flaws and opportunities for better US health care*. Retrieved from http://www.commonwealthfund.org/publications/fund-reports/2017/jul/mirror-mirror-international-comparisons-2017:

Schofield, L., Welfare, E., & Mercer, S. (2017). In-situ simulation. *Trauma*, 1460408617711729. doi:10.1177/1460408617711729

Schroeder, S. A., & Frist, W. (2013). Phasing out fee-for-service payment. *New England Journal of Medicine, 368*(21), 2029-2032.

Schuetz, B., Mann, E., & Everett, W. (2010). Educating health professionals collaboratively for team-based primary care. *Health Affairs, 29*(8), 1476-1480.

Schwandt, T. A., & Gates, E. F. (2017). Case study methodology. In N. K. Denzin & Y. S. Lincoln (Eds.), *The sage handbook of qualitative research* (5 ed., pp. 922): SAGE Publications.

Schweitzer, M., Fahy, B., Leib, M., Rosenquist, R., & Merrick, S. (2013). The perioperative surgical home model. *American Society of Anesthesiologists, Newsletter, 77*(6), 58-59.

Schweitzer, M., Kain, Z., & Cole, D. (2014). The role of the physician anesthesiologist in the perioperative surgical home. *ASA Monitor, 78*(4), 7-13.

SCOPME, Standing Committee on Postgraduate Medical Education in England. (1994). *A working paper for consultation on continuing professional development for doctors and dentists : With three examples of CPD in action* (873436211 9781873436219). Retrieved from London, UK: http://www.worldcat.org/title/working-paper-for-consultation-on-continuing-professional-development-for-doctors-and-dentists-with-three-examples-of-cpd-in-action/oclc/59605426

Senge, P. (2006). *The fifth discipline: The art & practice of the learning organization* (2nd ed.). U.S.: Doubleday, Rendom House.

sermo.com. (2018). What is sermo? Retrieved from sermo.com

Seymour, N. E., Cooper, J. B., Farley, D. R., Feaster, S. J., Ross, B. K., Pellegrini, C. A., & Sachdeva, A. K. (2013). Best practices in interprofessional education and training in surgery: Experiences from American college of surgeonsb−accredited education institutes. *Surgery, 154*(1), 1-12.

Shahoumian, A., Parchoma, G., & Hanson, J. (2014). *Blended simulation based medical education: A durable network for learning.* Paper presented at the Proceedings of the 9th International Conference on Networked Learning. Retreived from http://www.lancaster.ac.uk/fss/organisations/netlc/past/nlc2014/abstracts/pdf/shahoumian.pdf, Edinburgh, UK.

Shershneva, M. B., Mullikin, E. A., Loose, A.-S., & Olson, C. A. (2008). Learning to collaborate: A case study of performance improvement CME. *Journal of Continuing Education in the Health Professions, 28*(3), 140-147. doi:10.1002/chp.181

Shojania, K. G., & Grimshaw, J. M. (2005). Evidence-based quality improvement: The state of the science. *Health affairs, 24*(1), 138-150.

Shojania, K. G., Silver, I., & Levinson, W. (2012). Continuing medical education and quality improvement: A match made in heaven? *Annals of internal medicine, 156*(4), 305-308.

Shortell, S. M., Bennett, C. L., & Byck, G. R. (1998). Assessing the impact of continuous quality improvement on clinical practice: What it will take to accelerate progress. *Milbank Q, 76*(4), 593-624, 510.

Sia, C., Tonniges, T. F., Osterhus, E., & Taba, S. (2004). History of the medical home concept. *Pediatrics, 113*(Supplement 4), 1473-1478.

Sibert, K. S. (2016, 23rd October, 2016). Michael porter at the ASA: Is anesthesiology a specialist silo? *A Penned Point.* Retrieved from http://apennedpoint.com/michael-porter-at-the-asa-is-anesthesiology-a-specialist-silo/

Siemens, G. (2005). Connectivism: A learning theory for the digital age. *International Journal of Instructional Technology and Distance Learning, 2*(1).

Simons, P. R.-J., & Ruijters, M. C. (2004). Learning professionals: Towards an integrated model. In *Professional learning: Gaps and transitions on the way from novice to expert* (pp. 207-229): Springer.

Sims-Schouten, W., Riley, S. C., & Willig, C. (2007). Critical realism in discourse analysis: A presentation of a systematic method of analysis using women's talk of motherhood, childcare and female employment as an example. *Theory & Psychology, 17*(1), 101-124.

Singh, G., McPherson, M., & Sandars, J. (2014). Healthcare electronic continuing professional development: 5 key design features to improve impact. In G. Trentin (Ed.), *Network-based continuing medical education: Social media and professional development* (pp. 35-55): Nova Science Publishers, Incorporated.

Smith, J. M., & Szathmary, E. (1997). *The major transitions in evolution*: Oxford University Press.

Sørensen, J. L., Østergaard, D., LeBlanc, V., Ottesen, B., Konge, L., Dieckmann, P., & Van der Vleuten, C. (2017). Design of simulation-based medical education

and advantages and disadvantages of in situ simulation versus off-site simulation. *BMC medical education, 17*(1), 20.

Spinuzzi, C. (2014). How nonemployer firms stage-manage ad hoc collaboration: An activity theory analysis. *Technical Communication Quarterly, 23*(2), 88-114.

Stetsenko, A., Arievitch, I., & Blunden, A. (2014). Vygotskian collaborative project of social transformation: History, politics, and practice in knowledge construction. In A. Blunden (Ed.), *Collaborative projects: An interdisciplinary study* (pp. 217-238). Boston, U.S.: Brill.

Stocker, M., Burmester, M., & Allen, M. (2014). Optimisation of simulated team training through the application of learning theories: A debate for a conceptual framework. *BMC Medical Education, 14*(1), 69.

Strasburger, V. C. (2011). Ain't misbehavin': Is it possible to criticize maintenance of certification (MOC)? *Clinical Pediatrics, 50*(7), 587-590.

Sturmberg, J. P., O'Halloran, D. M., & Martin, C. M. (2013). Healthcare reform: The need for a complex adaptive systems approach. In *Handbook of systems and complexity in health* (pp. 827-853): Springer.

Sulkes, D. (Producer). (2014, 10/26/2014). ACEHP quality improvement education initiative webinar, october 24, 2014. *Alliance Town Hall Webinar*. Retrieved from http://www.acehp.org/imis15/acme/pdfs/Alliance_Town_Hall_Oct2014.pdf

Sutton, R. I., & Staw, B. M. (1995). What theory is not. *Administrative Science Quarterly*, 371-384.

Swanson, C., & Widmer, M. (2018). Transforming health education to catalyze a global paradigm shift: Systems thinking, complexity, and design thinking. In J. P. Sturmberg (Ed.), *Putting systems and complexity sciences into practice: Sharing the experience* (pp. 119-132). Cham: Springer International Publishing.

Swartz, L. B., Cole, M. T., & Lovejoy, D. A. (2010). Ensuring users' rights to privacy, confidence and reputation in the online learning environment: What should instructors do to. *Information Communication Technology Law, Protection and Access Rights: Global Approaches and Issues: Global Approaches and Issues*, 346.

Swartz, L. B., Cole, M. T., & Lovejoy, D. A. (2010). Ensuring users' rights to privacy, confidence and reputation in the online learning environment: What should instructors do to protect their students' privacy? In I. M. Portela (Ed.), *Information communication technology law, protection and access rights: Global approaches and issues*: Information Science Reference.

Szathmáry, E., & Smith, J. M. (1995). The major evolutionary transitions. *Nature, 374*, 227. doi:10.1038/374227a0

Tattersall, R. (2002). The expert patient: A new approach to chronic disease management for the twenty-first century. *Clinical Medicine, 2*(3), 227-229.

Taylor, D. C., & Hamdy, H. (2013). Adult learning theories: Implications for learning and teaching in medical education: AMEE guide no. 83. *Medical Teacher, 35*(11), e1561-e1572.

Taylor, J. C. (2001). Fifth generation distance education. *Instructional Science and Technology, 4*(1), 1-14.

Teirstein, P. S. (2015). Boarded to death—why maintenance of certification is bad for doctors and patients. *New England Journal of Medicine, 372*(2), 106-108.

Tempero, M. (2017). Mad about MACRA. *Journal of the National Comprehensive Cancer Network, 15*(2), 137-137.

Tilly, C. (2006). *Why? What happens when people give reasons … and why*. Princeton, N.J. U.S.: Princeton University Press.

Tucker, J. (2014). Against libertarian brutalism: Will libertarianism be brutalist or humanitarian? Everyone needs to decide. Retrieved from https://fee.org/articles/against-libertarian-brutalism/

U.S. Congress. (2010). Patient protection and affordable care act. Retrieved from http://www.hhs.gov/healthcare/rights/law/index.html

Medicare access and chip reauthorization act of 2015, 114–10 C.F.R. (2015).

Ubbink, D. T., Visser, A., Gouma, D. J., & Goslings, J. C. (2012). Registration of surgical adverse outcomes: A reliability study in a university hospital. *British Medical Journal, 2*(3), e000891.

Vaismoradi, M., Turunen, H., & Bondas, T. (2013). Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. *Nursing & health sciences, 15*(3), 398-405.

Vakani, F. S., & O'Beirne, R. (2015). Performance improvement CME for quality: Challenges inherent to the process. *International Journal of Health Care Quality Assurance, 28*(7), 746-750.

van Baalen, S., & Boon, M. (2015). An epistemological shift: From evidence-based medicine to epistemological responsibility. *Journal of Evaluation in Clinical Practice, 21*(3), 433-439. doi:10.1111/jep.12282

van Baalen, S., Boon, M., & Bluhm, R. (2017). Evidence-based medicine versus expertise: Knowledge, skills and epistemic actions. In *Knowing and acting in medicine* (pp. 21-38): Rowman & Littlefield International.

van Baalen, S., Carusi, A., Sabroe, I., & Kiely, D. (2017). A social-technological epistemology of clinical decision-making as mediated by imaging. *Journal of Evaluation in Clinical Practice, 23*(5), 949-958.

van Dulmen, S., McCormack, B., Eide, T., Skovdahl, K., & Eide, H. (2017). Future directions for person-centred healthcare research. In S. van Dulmen, B. McCormack, T. Eide, K. Skovdahl, & H. Eide (Eds.), *Person-centred healthcare research* (pp. 240). Pondicherry, India: John Wiley & Sons, 2017.

Vincent, S., & Wapshott, R. (2014). Critical realism and the organizational case study -a guide to discovering institutional mechanisms. In P. K. Edwards, J. O'Mahoney, & S. Vincent (Eds.), *Studying organizations using critical realism: A practical guide* (Vol. 1, pp. 148-167). 198 Madison Avenue, New York, N.Y. 10016, U.S.: Oxford University Press ,Great Clarendon Street, Oxford, OX2 6DP, UK.

von Goethe, J. W. (1908). The maxims and reflections of Goethe (T. B. Saunders, Trans.). In *Art in Theory* (Second and revised ed., Vol. 1900, pp. 235). London, UK: Macmillan and Co. .

Vygotsky, L. S. (1978). Mind and society: The development of higher mental processes. In: Cambridge, MA: Harvard University Press.

Wahlqvist, M., Gunnarsson, R. K., Dahlgren, G., & Nordgren, S. (2010). Patient-centred attitudes among medical students: Gender and work experience in

health care make a difference. *Medical Teacher, 32*(4), e191-e198. doi:10.3109/01421591003657451

Wall, B. M. (2012). History of hospitals. *Nursing History and Health Care*.

Walsh, D., & Evans, K. (2014). Critical realism: An important theoretical perspective for midwifery research. *Midwifery, 30*(1), e1-e6. doi:https://doi.org/10.1016/j.midw.2013.09.002

Ward, K., Hoare, K. J., & Gott, M. (2015). Evolving from a positivist to constructionist epistemology while using grounded theory: Reflections of a novice researcher. *Journal of Research in Nursing, 20*(6), 449-462. doi:doi:10.1177/1744987115597731

Watkins, I., & Xie, B. (2014). Ehealth literacy interventions for older adults: A systematic review of the literature. *Journal of medical Internet research, 16*(11), e225.

Webster-Wright, A. (2009). Reframing professional development through understanding authentic professional learning. *Review of educational research, 79*(2), 702-739.

Weinger, M. B., Banerjee, A., Burden, A. R., McIvor, W. R., Boulet, J., Cooper, J. B., . . . Gaba, D. M. (2017). Simulation-based assessment of the management of critical events by board-certified anesthesiologists. *Anesthesiology, 127*(3), 475-489. doi:10.1097/ALN.0000000000001739

Weiss, M., Kolbe, M., Grote, G., Spahn, D. R., & Grande, B. (2017). Why didn't you say something? Effects of after-event reviews on voice behaviour and hierarchy beliefs in multi-professional action teams. *European Journal of Work and Organizational Psychology, 26*(1), 66-80. doi:10.1080/1359432X.2016.1208652

Wellington, J. (2015). *Educational research: Contemporary issues and practical approaches*: Bloomsbury Publishing.

Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity*. Cambridge: Cambridge University Press.

Wenger, E. (1999). Learning as social participation. *Knowledge Management Review, 1*(6), 30-33.

Wenger, E. (2000). Communities of practice and social learning systems. *Organization, 7*(2), 225-246.

West, A., & Parchoma, G. (2016). *Assessment in clinical simulation: Current practices, changing influences, and the potential role of networked learning in shaping the future.* Paper presented at the Proceedings of the 10th International Conference on Networked Learning.

West, S. A., Fisher, R. M., Gardner, A., & Kiers, E. T. (2015). Major evolutionary transitions in individuality. *Proceedings of the National Academy of Sciences of the United States of America, 112*(33), 10112-10119. doi:10.1073/pnas.1421402112

WFME, World Federation for Medical Education. (2015). *Continuing professional development (CPD) of medical doctors - WFME global standards for quality improvement*. Retrieved from http://wfme.org/publications/wfme-global-standards-cpd-english/

Wheelahan, L. (2007). Blending activity theory and critical realism to theorise the relationship between the individual and society and the implications for pedagogy. *Studies in the Education of Adults, 39*(2), 183-196.

White, K., & Willis, E. (2002). Positivism resurgent: The epistemological foundations of evidence-based medicine. *Health Sociology Review, 11*(1-2), 5-15. doi:10.5172/hesr.2002.11.1-2.5

Whitehead, T. D., & Lacey-Haun, L. (2008). Evolution of accreditation in continuing nursing education in America. *The Journal of Continuing Education in Nursing, 39*(11), 493-499.

WHO, World Health Organization. (2010). *Framework for action on interprofessional education and collaborative practice*. Retrieved from http://www.who.int/hrh/resources/framework_action/en/

WHO, World Health Organization. (2015). *Tracking universal health coverage: First global monitoring report*. Geneva, Switzerland: World Health Organization.

Whyte, S., Paradis, E., Cartmill, C., Kuper, A., Boon, H., Hart, C., . . . Whitehead, C. R. (2017). Misalignments of purpose and power in an early Canadian interprofessional education initiative. *Advances in Health Sciences Education*. doi:10.1007/s10459-016-9746-x

Williams, L., Rycroft-Malone, J., & Burton, C. (2017). Bringing critical realism to nursing practice: Roy bhaskar's contribution. *Nursing Philosophy, 18*(2), e12130.

Williams, M. (2014). Probability and models. In P. K. Edwards, J. O'Mahoney, & S. Vincent (Eds.), *Studying organizations using critical realism: A practical guide* (Vol. 1, pp. 282-299). 198 Madison Avenue, New York, N.Y. 10016, U.S.: Oxford University Press ,Great Clarendon Street, Oxford, OX2 6DP, UK.

Williams, S. J. (1999). Is anybody there? Critical realism, chronic illness and the disability debate. *Sociology of Health & Illness, 21*(6), 797-819.

Wirz, L., Bogdanov, M., & Schwabe, L. (2018). Habits under stress: Mechanistic insights across different types of learning. *Current Opinion in Behavioral Sciences, 20*(Supplement C), 9-16. doi:https://doi.org/10.1016/j.cobeha.2017.08.009

Wong, B. M., Etchells, E. E., Kuper, A., Levinson, W., & Shojania, K. G. (2010). Teaching quality improvement and patient safety to trainees: A systematic review. *Academic Medicine, 85*(9), 1425-1439.

Wood, F. H., & Thompson, S. R. (1980). Guidelines for better staff development. *Educational leadership, 37*(5), 374-378.

Woolf, S. H. (2007). Potential health and economic consequences of misplaced priorities. *JAMA, 297*(5), 523-526.

Wuisman, J. J. (2005). The logic of scientific discovery in critical realist social scientific research. *Journal of Critical Realism, 4*(2), 366-394.

Wutoh, R., Boren, S. A., & Balas, E. A. (2004). Elearning: A review of internet-based continuing medical education. *Journal of Continuing Education in the Health Professions, 24*(1), 20-30.

Wyer, P. C., Alves Silva, S., Post, S. G., & Quinlan, P. (2014). Relationship-centred care: Antidote, guidepost or blind alley? The epistemology of 21st century health care. *Journal Of Evaluation In Clinical Practice, 20*(6), 881-889. doi:10.1111/jep.12224

Wynia, M. K. (2009). The risks of rewards in health care: How pay-for-performance could threaten, or bolster, medical professionalism. *Journal of General Internal Medicine, 24*(7), 884-887.

Wynn Jr, D., & Williams, C. K. (2012). Principles for conducting critical realist case study research in information systems. *MIS quarterly*, 787-810.

Yancey, N. R. (2015). Why teach nursing theory? *Nursing science quarterly, 28*(4), 274-278.

Yin, R. K. (2009). *Case study research: Design and methods*: SAGE Publications.

Zigmont, J., Kappus, L., & Sudikoff, S. (2011). Theoretical foundations of learning through simulation. *Seminars in Perinatology, 35*, 47 - 51.

Zuvekas, S. H., & Cohen, J. W. (2016). Fee-for-service, while much maligned, remains the dominant payment method for physician visits. *Health Affairs, 35*(3), 411-414.

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