

**This is a self-archived version of an original article. This version may differ from the original in pagination and typographic details.**

**Author(s):** Tynjälä, Päivi; Heikkinen, Hannu L. T.; Kallio, Eeva K.

**Title:** Professional expertise, integrative thinking, wisdom, and phronesis

**Year:** 2020

**Version:** Accepted version (Final draft)

**Copyright:** © The contributors, 2020

**Rights:** In Copyright

**Rights url:** <http://rightsstatements.org/page/InC/1.0/?language=en>

**Please cite the original version:**

Tynjälä, P., Heikkinen, H. L. T., & Kallio, E. K. (2020). Professional expertise, integrative thinking, wisdom, and phronesis. In E. Kallio (Ed.), *Development of adult thinking : Interdisciplinary perspectives on cognitive development and adult learning* (pp. 156-174). Routledge.  
<https://doi.org/10.4324/9781315187464-10>

**Citation:** Tynjälä, P., Kallio, E.K. & Heikkinen, H.L.T. (2020) Professional Expertise, Integrative Thinking, Wisdom and Phronēsis. In Kallio, E. K. (Ed.). (2020). *Development of Adult Thinking: Interdisciplinary Perspectives on Cognitive Development and Adult Learning*. London: Routledge.

**Päivi Tynjälä, Eeva K. Kallio & Hannu L. T. Heikkinen**

**Professional Expertise, Integrative Thinking, Wisdom and Phronēsis**

## Abstract

This chapter examines adult thinking from the perspective of professional expertise and *phronēsis*, that is, practical wisdom. It first describes differences between experts and novices, and presents three conceptualisations of the development of expertise. This is followed by an analysis of the form of adult thinking referred to as integrative thinking, and *phronēsis*. The relationship of these two with expertise is examined. The analysis shows that professional expertise requires holistic thinking involving the ability to integrate or conciliate various and even conflicting perspectives in order to find new solutions to problems. Furthermore, the role of emotions and ethical reflection is emphasised. All this lead to the examination of practical wisdom, *phronēsis*, in particular. As a conclusion, a model of the nature of wisdom in professional expertise is presented, and it is suggested that the development of expertise and wisdom in the fast changing and complex world requires pedagogical approaches that support the integration and fusion of different forms of knowledge, various perspectives, and socially responsible ethical action and interaction in problem solving situations.

-----

## Introduction

In his novel *Atonement*, Ian McEwan (2001, p. 276–277) depicts a scene from World War II: A young nurse is facing the problem of a large number of wounded soldiers arriving at the ward. According to normal procedures, arriving patients should be given a bath, change into hospital pajamas and be guided to their bed, but these soldiers chose their bed themselves without washing and changing. In this situation, the novice nurse demanded that the soldiers follow the rules: “You must get up, there is a procedure”, she said. An expert nurse

intervened and solved the situation by being flexible: “The men need to sleep. The procedures are for later.”

The fictional scene above illustrates that *experts think differently from novices*. Research on expertise has identified the following differences between expert performers and beginners (Chi, Glaser, & Farr, 1988; Boshuizen, Bromme, & Gruber, 2004; Ericsson, Charness, Feltovich, & Hoffman, 2006; Feltovich, Prietula, & Ericsson, 2006; Harteis & Billett, 2013):

- Experts have larger and more integrative knowledge units, and their representations of information are more functional and abstract than those of novices, whose knowledge base is more fragmentary. For example, a beginning piano player reads sheet music note by note, whereas a concert pianist is able to see the whole row or even several rows of music notation at the same time.
- When solving problems, experts may spend more time on the initial problem evaluation and planning than novices. This enables them to form a holistic and in-depth understanding of the task and usually to reach a solution more swiftly than beginners.
- Basic functions related to tasks or the job are automated in experts, whereas beginners need to pay attention to these functions. For instance, in a driving school, a young driver focuses his or her attention on controlling devices and pedals, while an experienced driver performs basic strokes automatically. For this reason, an expert driver can observe and anticipate traffic situations better than a beginning driver.
- Experts outperform novices in their metacognitive and reflective thinking. In other words, they make sharp observations of their own ways of thinking, acting and working, especially in non-routine situations when automated activities are challenged.
- Beginners’ knowledge is mainly explicit and they are dependent on learned rules. In addition to explicit knowledge, experts have tacit or implicit knowledge that accumulates with experience. This kind of knowledge makes it possible to make fast decisions on the basis of what is often called *intuition*. To attain the best possible solution to a problem in situations where circumstances radically deviate from the norm, experts may decide to break learned rules, as was the case in the hospital example above.

In situations where something has gone wrong or when experts face totally new problems but are not required to make fast decisions, they critically reflect on their actions. Unlike beginners, experienced professionals focus their thinking not only on details but rather on the totality consisting of the details. Thus, experts' thinking is more holistic than the thinking of novices. It seems that the quality of thinking is associated with the quality and amount of knowledge. With a fragmentary knowledge base, a novice in any field may remain on lower levels of thinking: things are seen as black and white, without any nuances. In contrast, more experienced colleagues with a more organised and holistic knowledge base can access more material for their thinking, and, thus, may begin to explore different perspectives on matters and develop more relativistic views concerning certain problems. At the highest levels of thinking, an individual is able to reconcile different perspectives, either by forming a synthesis or by integrating different approaches or views (e.g., Borawski, 2017; Paletz, Bogue, Miron-Spektor, & Spencer-Rodgers, 2018; Kallio, 2001, 2011, see articles in Section I of this book).

In this chapter, we examine adult thinking from the perspective of professional expertise. Typical of expert work in any domain is solving ill-defined or complex problems, which requires higher-order thinking. In the following sections, we first present three conceptualisations of expertise development that lead us to the notion of the role of multiple perspectives and solving complex problems for the development of higher-order thinking. Further, this examination leads us to the concept of integrative thinking, that is, a form of thinking where an individual integrates ideas and even opposing perspectives, able to form a synthesis based on these different perspectives. Then, we expand the discussion of expertise from traditional cognitive approaches toward more holistic views. In a fast changing world with increasingly complicated problems that are morally and ethically loaded, there is a need to examine professional expertise from more and wider perspectives than before. We suggest that the concept of practical wisdom provides such a broader viewpoint. Integrative thinking has been proven to be an important element of wisdom (Labouvie-Vief, 1990; Kallio, 2015, Chapter 2). In our discussion on wisdom, we rely both on current research on wisdom and, in particular, the Aristotelian notion of *phronēsis*, that is, practical wisdom. Finally, we present a conceptualisation of wisdom in professional expertise needed in the present-day world's

problems of unprecedented complexity. At the core of this model are integrative thinking and problem solving involving ethical judgement and social responsibility.

## Development of Expertise: The Role of Complex Problems, Multiple Perspectives, and Integrative Thinking

Historically, three principal conceptualisations of the development of expertise have been presented. First, Ericsson (2006) has coined the term *deliberate practice* to illustrate the process of expertise development. This concept arose from the observation that extensive experience in a domain does not automatically lead to superior performance, but that an intensive and goal-oriented pursuit of improvement is needed to achieve the highest levels of competence. Characteristic of deliberate practice is an individual's intentional goal setting, continuous monitoring of his or her performance, and recognising errors and correcting them. The aim is to reach goals that are initially outside the individual's achievement but that can be reached with intensive practice. What is of special importance in this is the role of the more experienced colleague, mentor or coach whose feedback helps to identify the specific components of the task or performance that need improvement. Gradually, the performer acquires mechanisms that help him- or herself to self-evaluate and control his/her own performance. Thus, the acquisition of expertise can be described as a series of states with mechanisms for monitoring and guiding future improvements of specific aspects of performance (Ericsson, 2006).

Secondly, Bereiter and Scardamalia (1993) have described expertise development as a process of *progressive problem solving*. A basic assumption in this model is problem solving at the core of an expert's activities; in their daily work, professionals continuously solve more or less complicated problems. In these activities, knowledge transformations take place: "formal knowledge is converted into informal knowledge by being used to solve problems of understanding; formal knowledge is converted into skill by being used to solve problems of procedure" (Bereiter & Scardamalia, 1993, p. 66). Roughly speaking, professionals can be divided into two groups when it comes to problem solving: first, there are individuals who develop routines that make their work easier and they keep solving familiar problems with familiar ways. At this level, such persons are generally referred to as *routine experts*. Another

type of professional, often called *adaptive experts* (Hatano & Oura, 2003), utilise the automatisisation and routinising of certain activities so that they can invest their freed mental resources in setting new tasks that are more challenging than the previous ones. In this way, they work on the limits of their competence and rise above their previous achievements while continuously solving more and more demanding problems. In this process of progressive problem solving, their expertise develops further, whereas the routine experts, although skillful, remain fixed at a certain stage in the development of their competence.

In fact, the definition of expertise development as ‘progressive problem solving’ is similar to the concept of ‘deliberate practice’, which Ericsson (2006, p. 694) describes as follows: “The key challenge for aspiring expert performers is to avoid the arrested development associated with automaticity and to acquire cognitive skills to support their continued learning and improvement. By actively seeking out demanding tasks – often provided by their teachers and coaches – that force the performers to engage in problem solving and to stretch their performance, the expert performers overcome the detrimental effects of automaticity and actively acquire and refine cognitive mechanisms to support continued learning and improvement.”

Bereiter and Scardamalia (1993) also pointed out that expertise goes beyond an individual activity. They emphasise the role of team work and workplace culture as a promoter of or barrier to progressive problem solving. Similarly, recent socio-cultural theories have stressed that expert problem solving is a social process by nature. For example, Hakkarainen, Palonen, Paavola, and Lehtinen (2004) talk about *networked expertise*, and Engeström (2004) about *negotiated knotworking*. In these views, the development of expertise or progressive problem solving can be characterised as collaborative, expansive and transformative learning.

The third model of expertise development utilises the concepts of deliberate practice and progressive problem solving, and integrates these with the descriptions of the nature of expert knowledge and adult thinking. According to the model of *integrative pedagogy* (e.g., Tynjälä, 2008; Tynjälä & Gijbels, 2012; Tynjälä, Häkkinen, & Hämäläinen, 2014; Tynjälä, Virtanen, Klemola, Kostiainen, & Rasku-Puttonen, 2016), expertise development can be advanced by

supporting learners to integrate and fuse different elements of expert knowledge: conceptual (i.e., theoretical, declarative or storable knowledge), practical (i.e., procedural or experiential knowledge or skill), self-regulatory, and socio-cultural knowledge (e.g., Bereiter, 2002; Bereiter & Scardamalia, 1993; Eraut, 2004; Le Maistre & Paré, 2006; Tynjälä, 2009). Although the different forms of knowledge can be analytically separated, in high-level expertise they are tightly integrated and fused together. For this reason, the Integrative Pedagogy model encourages learners (whether students or professionals) to make connections between these forms of knowledge.

While the first three forms of knowledge are personal, the fourth one, socio-cultural knowledge, is an aspect included in practices and devices of social communities rather than possessed by individuals. For example, every workplace has its own written or unwritten rules on how things are to be taken care of. Therefore, socio-cultural knowledge can only be accessed by participating in communities of practice. The Integrative Pedagogy model is based on the idea that student learning in higher education and vocational education and training should involve participating in authentic practices in the workplace, or, if this cannot be organised, simulations of authentic practices can be utilised. The core processes in learning are problem solving and integrative thinking requiring combining and fusing the different forms of knowledge.

Cognitive learning theories have suggested that learners benefit from working with various perspectives on a subject and obtaining multiple representations (van Someren, Reimann, Boshuizen, & de Jong, 1998; Kallio, 1998). For example, in a study conducted with students of business administration, the students with multiple perspectives applied their knowledge to complex tasks in a more flexible way than did those who tackled the problems only from a single perspective (Stark, Gruber, Hinkofer, & Mandl, 2004, p. 59). Thus, it seems that examining things from different viewpoints is important for the development of thinking. Exposing learners to various perspectives seems to raise the level of complexity in thinking. For instance, Lehtinen (2002), upon examining university students' studying of research methods, concluded that facing complexity from the very beginning helped learners to understand the domain better.

In sum, the conceptualisations of expertise development described above suggest that essential elements in this process are:

- intentional and goal-oriented pursuit of better performance and understanding
- continuous individual and social problem solving and challenges that go beyond earlier tasks
- integrative thinking involving connecting and fusing different forms of knowledge and pondering problems from different angles.

In the next section, we examine integrative thinking in more detail.

## Integrative Thinking

As described above, multiperspective and integrative thinking are important parts of the development of professional expertise. Kallio argues, in Chapter 2, that integration itself is a multi-dimensional concept. Integration presupposes differentiation, that is, separate objects to be integrated (at least two separate objects that are interrelated in one way or another).

Etymologically, integration means ‘rendering something whole’. The word integration comes from the Latin *integratus*, the past participle of the verb *integrare* (‘to make whole’), which in turn stems from *integer* (‘whole’ or ‘complete’, figuratively ‘untainted’ or ‘upright’, and literally ‘untouched’). Literally, the etymological meaning of the word is to “put together parts or elements and combine them into a whole” (Integrate, 2019).

However, whenever we are putting something together from parts, something new emerges that is more than the sum of the parts. According to Kallio (2011), the integration of different objects of thinking goes beyond merely adding or linking things together. Integration, from this perspective, presupposes renewal and something that has not existed before. Thus, in integration, the mental objects are fused together so that the outcome is a synthesis. As the number of related objects increases, the level of complexity increases at the same time. The integration of different viewpoints, angles, perspectives or objects is not necessarily just cognitive. For example, Labouvie-Vief (1990; 2015) has emphasised the integration of emotions and intellect in adult thinking. Similarly, practical action and theoretical knowledge may be integrated as in the Integrative Pedagogy model described above. These objects of thought may or may not be contradictory, but it is also possible that viewpoints complement



each other or at least do not have any contradictory elements. The key outcome in each case is the fusion and synthesis of different elements.

In her review of research on adult thinking, Kallio (2011) has suggested that the integration of different viewpoints or objects of thinking is the key to the development of various forms of higher-order thinking, such as relativistic-dialectical (Marchand, 2002) or postformal (Kallio, 2001) thinking. Typical features of higher-order thinking include understanding the relativistic nature of knowledge, acceptance of contradictions between different viewpoints, and integration of contradictory views (Kramer, 1983).

Based on research findings on expertise, on the one hand, and on adult thinking, on the other hand, we can hypothesise that there is a relationship between the development of thinking and the development of expertise, and that both are related to the quantity and quality of knowledge acquired as well as to the way in which knowledge is processed. In an ideal case, an individual has opportunities to participate in diverse communities of practice (see Wenger, 1998; Wenger-Trayner, Fenton O’Creevy, Hutchinson, Kubiak, & Wenger-Trayner, 2015) where he or she can acquire and utilise different forms of expert knowledge: 1) conceptual or theoretical knowledge that helps him or her understand the topic better, 2) practical or procedural knowledge that develops through experience and improves skills, 3) self-regulative knowledge that develops when an individual reflects on his or her experiences, and 4) socio-cultural knowledge embedded in the social practices of the community. While acting in communities – which may be professional, educational, hobby-related or personal in nature – an individual encounters what are more or less complicated problems, diverse knowledge and multiple perspectives, which lead him or her to actively and critically ponder problems from different angles. In this process, an individual realises that knowledge is relative to the angle from which a problem is considered, and thus dualistic thinking is replaced by relativistic thinking. With more experience of ill-defined problems, people come to understand that there are no straightforward solutions for complex problems, and that they need to find solutions with which different, even opposite, approaches can be reconciled. In other words, integrative thinking is needed (Kallio, 2011).

Sometimes, unexpected solutions to complex problems are found when they are considered jointly by different people from various backgrounds. Combinations of experts can be arranged intentionally for this purpose, thereby creating conditions for *emergent systems*. The deliberative collaboration of experts from different backgrounds may generate results that are greater than the sum of the elements involved. These kinds of combinations of experts can constitute conditions for high-performance collaborative processes that nobody has planned and no one can actually plan beforehand or manage alone. This kind of playful and creative collaborative work enabling creative and free combinations of thoughts has also been called *bricolage* (Denzin & Lincoln, 2005). The word ‘bricolage’ comes from the French language and refers to a kind of work in which materials of different types are put together. Bricolage presupposes divergent thinking that allows one to combine and play with things in an unprejudiced way. Breakthroughs in science, technology and society often involve this kind of *emergent thinking*, which is best achieved by enabling conditions for creative playfulness (Salo & Heikkinen, 2018).

So far in our analysis, we have examined the concepts of expertise and integrative thinking. Both of these concepts seem to have a close connection to the concept of *wisdom*. For example, Kitchener, King and DeLuca (2006, p. 73) define wisdom as expert knowledge involving good judgement and advice in the domain of fundamental pragmatics of life, and emphasise the uncertainty of knowledge. According to Baltes and Staudinger (2000), relativistic-dialectical thinking – which Kallio (2011) redefines as integrative thinking – is an important component of wisdom. Similarly, Kunzmann and Stange (2007) see a close link between wisdom and higher-order thinking, and suggest that the integration of knowledge and character, mind and virtue is at the core of wisdom. In the same vein, Staudinger and Glück (2011, p. 217) see the core of wisdom as consisting of understanding and reconciling contradictory ideas, such as the “dialectic between good and bad, positive and negative, dependence and independence, certainty and doubt, control and lack of control, finiteness and eternity, strength and weakness, and selfishness and altruism”. Furthermore, integrative thinking seems to be an essential element of professional expertise, as is wisdom. In the next section, we discuss the concept of wisdom and its relation to expertise.

## Wisdom Models and Their Connections to Research on Professional Expertise

The concept of wisdom is multi-dimensional and complex, and it may be analysed according to components with different criteria. The concept of wisdom holds a long-standing status among the ideas of history, philosophy (which means “*love of wisdom*”, literally), science and all of the world’s major religions and cultures (Curnow, 1999, 2010, 2015), and there is not a single discipline that could claim exclusivity for it. In general, wisdom can be defined as the ideal aim of advanced human development and learning, in the study of ontogeny (Swartwood & Tiberius, 2019). There are many definitions of wisdom, and also approaches, methods and disciplines that focus on it.

Regarding the current scientific wisdom research, there have been many conceptualisation attempts (Bangen, Meeks, & Jeste, 2013). We focus here mainly on those components of wisdom that are in some way linked to the main topics of this chapter: adult integrative cognitive development, Baltes and Staudinger’s (2000) and Sternberg’s (1998) models of wisdom and their connection to expertise, the role of emotions and practical action, plus the idea of *eudaimonia*, meaning ‘good life’, as a form of wisdom.

First, as already stated, the neo-Piagetian construct of postformal thinking (i.e., integrative thinking) has been commonly defined as a component of wisdom (Staudinger & Glück, 2011; Baltes & Staudinger, 2000; Grossmann, 2017). In this book, some models of adult cognitive development have already been reviewed, such as the Reflective Judgement model (by King & Kitchener, 1994; see also Chapter 4; and for a general review of the field, Chapter 2; and Sinnott’s Postformal model in Chapter 12; and for relativistic-dialectical thinking, see Chapter 13).

Secondly, practical life experience in diverse social situations cumulates wisdom. In the Berlin Wisdom Paradigm (Baltes & Staudinger, 2000), wisdom is described as deep understanding and a general expertise in the fundamental pragmatics of life. In the same vein,

Swartwood (2013) defines wisdom as an expert skill including intuitive, deliberative, meta-cognitive, self-regulative and self-cultivation abilities. Here, expertise refers to the kinds of insights that are only available through practical experience during one's life span. According to Baltes and Staudinger (2000), expertise and life knowledge, by definition, include the following aspects: rich declarative or factual knowledge, procedural (strategic) knowledge, contextualism, relativism, acceptance and management of life's uncertainties. These features are based on experiences that have accumulated during one's life span, and not just in some specialised field as in one's profession or work life. Latent, tacit knowledge can be used to satisfactorily solve problematic, complex, ill-defined questions (regarding tacit knowledge, see Chapter 9).

Sternberg (1998) has created a model of practical wisdom (Balance Wisdom model) in which tacit knowledge is the key component. The model is used to figure out how subjects understand and solve complex, difficult and contradictory problems in different fields. Wise decision-making implies appropriate procedural and specific knowledge. It also takes into account various perspectives, like intra-, inter- and extra-personal ones, judged against possible short- and long-term consequences. The goal is always for the common good, aiming at a prosocial, positively ethical result that benefits the larger group. Wisdom, thus, refers to the application of balanced judgement in complex problem situations – and also means that one can change one's judgement according to changes in the circumstances and conditions.

Third, all of these wisdom research models have placed strong emphasis on reflection and cognition. Feelings and emotions are taken into account implicitly, as in tacit knowledge or in adult developmental models integrating emotions and cognition (Labouvie-Vief, 2015). Emotions are also explicitly present in Ardel's (2003) Three-Dimensional Wisdom model. In this conceptualisation, wisdom is understood as an integrated whole of three elements of personality: the first component, *cognition*, is understood as a deep approach, involving seeking knowledge and truth both in oneself and in social spheres; understanding the contextuality and limits of knowledge are also a part of it. The second component of wisdom in this model is *reflection*: its definition comes close to multiperspective thinking, where one is able to view the relativity of a multitude of viewpoints; at the same time, it incorporates

self-understanding regarding one's own behaviour and mind. Finally, the third component, *affect*, refers to emotions like empathy and compassion: a wise person cares for and has positive emotions toward others.

Fourth, Yang (2017) criticises wisdom research for being focused more on thinking and feeling, but not so much on the aspect of *doing*. She uses the term *embodied wisdom* or *process theory of wisdom* to refer to her own three-component wisdom model. She has defined wisdom as an integrative process between thinking, feeling and acting. Wisdom cannot therefore be just a cognitive capacity. When asking laymen to name a wise person, they tend to nominate persons who have acted out and demonstrated an extraordinary ability. Real-life actions and concrete manifestations of wisdom are thus the major aspects of wisdom, according to Yang (2017).

Similar suggestions regarding the integration of emotion, cognition and motivation in wisdom have been stated by Staudinger and Glück (2011). 'Doing', as an aspect of wisdom, implies a purposeful aim for the benefit of the common social good as a person actualises his or her positive intentions: it includes carefully considering the *ethical prosocial implications of one's actions for the community at large*. Intentions and goals are ethical as it is assumed that the actions are undertaken for the common good and a positive outcome (Staudinger & Glück, 2011).

Law and Staudinger (2016) have analysed wisdom's close connection to *eudaimonia*, which is originally an Aristotelian term referring to leading a 'good life'. They agree that there are differences between these terms, but add that both constructs refer to high levels of personal growth and human flourishing. Next, we examine the Aristotelian concepts in more detail.

## Wisdom as Phronēsis: Philosophical Backgrounds

Wisdom, in professional expertise, can also be approached in terms of the different forms of knowledge, or dispositions to knowledge, and the corresponding forms of action. In this section, we look at the modern classification of expert knowledge through the lens of a synthesis of different forms of knowledge. Our review is based on Stephen Kemmis's interpretation, where Aristotle's forms of reasoning are integrated with the Theory of Knowledge and Human Interests by Jürgen Habermas (Kemmis & Smith, 2008).

Aristotle (384–322 BCE), in his *Book VI of the Ethics* (trans. 2011), discussed three forms of knowledge: one theoretical, called *epistēmē*; and two practical forms of knowledge: called *technē* and *phronēsis* (Saugstad, 2005; Heikkinen, de Jong, & Vanderlinde, 2016, p. 8). Each of these knowledge forms is actualised through specific activity forms (*epistēmē* => *theoria*; *technē* => *poiesis*; *phronēsis* => *praxis*). These forms of knowledge have had a remarkable influence on Western epistemology. For example, the etymological origins of the words theory and practice as well as technics and technology are rooted in this three-fold categorisation of knowledge (Heikkinen et al., 2016, p. 8).

The ideal form of *epistēmē* is to see the world around us as if seen through the “eyes of the gods on Mount Olympus in Ancient Greece”. The form of action associated with *epistēmē* is *theoria*, the original Greek meaning of which was seeing or watching. Literally, *theoria* means ‘looking at’, ‘gazing at’, or ‘being aware of’ (Mahon, Heikkinen, & Huttunen, 2018, p. 4). This form of knowledge is theoretical knowledge, and it was regarded as pure knowledge in the sense that the knowing subject has no aims or aspirations other than just knowing how things are (Mahon et al., 2018). Thus, *epistēmē* is based on the disposition to seek universal and eternal truth for its own sake, regardless of time and place (Aristotle, trans. 2011, 1139a27–8). From that perspective, expert knowledge should be based on objective and universal knowledge, which can be verified through a correspondence between propositions (truth claims) and the state of affairs in the world (Heikkinen et al., 2016, p. 8; Mahon et al., 2018, p. 3–4).

Another disposition to knowledge is manifested in producing material goods: *technē* (Aristotle, trans. 2011, 1094a5–10). *Technē* is the form of knowledge that is needed in

making or producing something; that is, *poiēsis* (making action). In contrast to *epistēmē*, *technē* is not valuable in itself. It is deemed ‘good’ and valid only if it helps to produce usable and appropriate objects or services, or when applied to develop methods that can be used in production. In other words, technical knowledge is instrumental: its aims are external to the knowledge itself. The term *technē* finds expression in the modern concepts of technical knowledge and technology. From this perspective, expert knowledge is understood in terms of technical expertise regarding technology and the production of goods and services (Mahon et al., 2018, p. 3–4).

The third disposition in Aristotle’s classical specification (trans. 2011, 1140b1–6) is *phronēsis*. Often translated as ‘practical wisdom’, *phronēsis* is the disposition to live a meaningful, happy and worthy life together with others; that is, knowing how to live a ‘good life’, *eudaimonia* (Mahon et al., 2018). The word *eudaimonia* cannot be translated into any language without a remainder, but most often it has been translated by using expressions describing living a ‘flourishing’, ‘happy’, ‘good’ or ‘worthwhile’ life; that is, a life worth living.

The form of action (‘doing’) associated with *phronēsis* is *praxis*; that is, action oriented toward living a virtuous life through choices based on judgements about what is wise and right to do in everyday human life. *Praxis* is a form of deliberate action in the social (and physical) world, based on reflective thinking about what is the best way to act in order to maximise the common well-being of a social community. In *praxis*, the impacts and consequences of actions are carefully considered (Mahon et al., 2018). As Kemmis and Smith (2008, p. 4) have crystallised, “*praxis* is what people do when they take into account all the circumstances and exigencies that confront them at a particular moment and then, taking the broadest view they can of what is best to do, they act”. In *praxis*, unlike *poiēsis*, the goals and means of activity cannot be separated; *praxis* is an end in itself. In terms of professional practice, action as *praxis* is itself rewarding for the expert. An expert enjoys the action itself, which promotes positive social relations achieved through the interaction with other people. From a *praxis* perspective, the ultimate aim and purpose of an expert is to foster understanding about how to live well, and to allow human flourishing and living a

meaningful life together with each other, outlining the place of humans in the world (Mahon et al., 2018, p. 3–6).

In addition to these three forms of disposition toward knowledge, Kemmis and Smith (2008) add a fourth one: a critical-emancipatory disposition to knowledge. The formulation of such interest in knowledge was first introduced in Habermas's (1972) Theory of Knowledge-Constitutive Interests (see Table 10.1). The critical-emancipatory interest in knowledge refers to a disposition to expose belief systems or ideologies that maintain an unreasonable and subordinating power over people. The purpose of critical-emancipatory knowledge is to enable people to critically reflect and to be released from the mechanisms of power that oppress or harm them. From this perspective, the social world is understood as a struggle for power. The *form of action* associated with this disposition is emancipatory action (Habermas, 1972; Kemmis & Smith, 2008), or empowering action (Heikkinen & Huttunen, 2017). This amounts to "collective critical reflection and action to overcome irrationality, injustice, suffering, harm, unproductiveness, or unsustainability" (Kemmis & Smith, 2008, p. 23). It is collective in the sense that it transpires in reflective communication and interaction with others. It is also transformative in that it leads (ideally and simultaneously) to changed circumstances and self-change (Mahon et al., 2018, p. 3–6).

The dispositions and associated forms of action outlined above are not separate entities. On the contrary, they are interconnected in many ways (Mahon et al., 2018). From this perspective, *expertise is essentially about the integration of these aforementioned forms of or dispositions to knowledge and the ability to act in accordance with them*. In order to achieve expertise in any professional field, we need all of these forms of knowledge; the ability to observe and see, understand and interpret the world (*theoria*); to utilise techniques, materials and natural resources in our work (*poiēsis*); as well as to more profoundly understand what is good for humans (*praxis*) and how to overcome injustice, irrationality and unsustainability in our societies (*emancipatory*) (Mahon et al., 2018). The aforementioned forms of knowledge can be juxtaposed with the concepts used in the contemporary research on professional expertise in the way suggested in Table 10.1.



Aristotle		Habermas		
<b>Knowledge-constitutive interests</b> (Habermas)		Technical	Practical (hermeneutical)	Critical-emancipatory
<b>Dispositions to knowledge</b> (Aristotle)	<i>Epistēmē</i>	<i>Technē</i>	<i>Phronēsis</i>	
<b>Action</b>	<i>Theoria:</i> Contemplation, for example, theoretical contemplation about the nature of things; <i>contemplative action</i>	<i>Poiēsis:</i> Action aimed at producing known ends; <i>making action</i>	<i>Praxis:</i> Action involving practical reasoning about what is wise, right and proper to do in a given situation and in terms of the good life; <i>doing action</i>	<i>Emancipatory:</i> Collective critical reflection and action to overcome injustice, irrationality, harm, and unsustainability; <i>empowering action</i>
<b>Realm</b>	<i>In the realm of ideas</i>	<i>In the material realm</i>	<i>In the social realm</i>	
<b>Aim</b> (telos)	Attainment of universal knowledge	Production of something	Good life; flourishing; life worth living ( <i>eudaimonia</i> )	Overcoming irrationality and injustice
<b>Position of the knowing subject</b>	External observer	Maker or designer of products	Agent in the social world	Questioner, critic (together with others)

Table 10.1

*A Synthesis of the Forms of Action and Dispositions to Knowledge of Aristotle (2011) and Jürgen Habermas (1972). (Adapted From Kemmis & Smith, 2008; Heikkinen, de Jong, & Vanderlinde, 2016; Heikkinen, Kiilakoski, Huttunen, Kaukko, & Kemmis, 2018; and Mahon, Heikkinen, & Huttunen, 2018.)*

## Toward a Synthesis of Expertise, Adult Cognitive Development and Phronēsis

In summary, we suggest two claims. Firstly, as a conclusion based on our analysis of the traditional forms of knowledge (Aristotle), the critical-emancipatory interest in knowledge

and the concepts used in contemporary research on expertise, we suggest the following synthesis (Table 10.2). It is evident that declarative knowledge is what we can typically associate with theoretical knowledge or the disposition that can be referred to as *epistēmē* in Aristotelian terms. We may also postulate a direct link between the technical knowledge in contemporary terms, the Aristotelian *technē*, and the Habermasian technical aspect of knowledge. The concepts of practical, procedural and experiential knowledge, however, cannot be reduced to any of the previously mentioned forms of knowledge. They are, at least to a large extent, associated with technical knowledge, but to some degree also with the *phronēsis* form of knowledge. Self-regulative knowledge, in turn, is clearly an element of *phronēsis*, but also the ability of critical and emancipatory reflection necessitates reflective and metacognitive skills. What is called *socio-cultural knowledge* in the contemporary research literature, in turn, is essentially what can be referred to as the *phronēsis* form of knowledge in the Aristotelian terminology. But likewise, a capacity for socio-cultural understanding is a necessary condition for critical-emancipatory reflection. Therefore, the socio-cultural and the self-regulative forms of knowledge both overlap with the *phronēsis* and the critical-emancipatory elements in the columns of Table 10.2.

Forms of knowledge				
Aristotle	<i>Epistēmē</i>	<i>Technē</i>	<i>Phronēsis</i>	
Habermas		Technical	Practical (hermeneutical)	Critical-emancipatory
<b>Contemporary research on expertise</b>	<i>Declarative conceptual</i>	<i>Technical knowledge</i>	<i>Practical, procedural and experiential knowledge</i>	<i>Self-regulative knowledge (metacognition, reflection) socio-cultural knowledge</i>
	or <i>theoretical knowledge</i>			

Table 10.2

*A Synthesis of the Forms of Action and Dispositions to Knowledge of Aristotle (2011) and Habermas (1972) and the Concepts Used in Contemporary Expert Research*

Secondly, we see resemblances between theoretisations across the three fields of research on professional expertise, adult cognitive development and wisdom. They have been developed as separate research lines but seem to share certain ideas, or at least exhibit “family resemblances”, to apply Ludwig Wittgenstein’s well-known concept (Wennerberg, 1967). The integration of practical action and theoretical knowledge is one theme that is in common to all these traditions. Thus, wisdom includes theoretical (reflective, contemplative) thinking and understanding, *epistēmē* in Aristotelian terms, but also *technē* (‘action aimed at producing known ends’) and *phronēsis*, as one acts for the common good to flourish, and *eudaimonia*, that is, for ethical goals. The practical consequences inform and enable judgement of whether an action has been wise or not. In wise action, positive effects for oneself and others are the natural result.

We must also remind readers of the risks of this kind of synthesis, where modern concepts and the concepts of ancient philosophy are merged, and this applies both to our aforementioned synthesis and the one suggested by Kemmis and Smith (2008). As Pierre Hadot (1995), a world-renowned expert on Hellenistic philosophy, has pointed out, the application of ancient Greek and Roman philosophy to present day situations is always risky. According to Hadot, it is not even possible to interpret the ancient philosophies “correctly”, because the ‘lifeworld’ of humans today is completely different from that of ancient times. Hadot claims that modern interpretations of ancient philosophy are actually misinterpretations, or even misunderstandings, and calls them “creative misinterpretations”. Nonetheless, Hadot does not want to deny anyone the freedom to introduce concepts of ancient philosophy into today’s debate; quite the contrary: “In fact, such new meanings correspond to the possibility of a kind of evolution of the original doctrine” (Hadot, 1995, p. 7). However, it is essential to also note that the meanings are construed fundamentally differently than in the ancient days.

Conclusion: Integrative Model of Wisdom in Professional Practice and Expertise

Based on the assumed ‘family resemblance’ of the three fields of research on expertise, adult cognitive development and wisdom, we suggest an *Integrative Model of Wisdom in Professional Practice and Expertise*, as shown in Figure 10.1. Although the components of the model can be analytically discerned from each other, in practice they are tightly integrated so that in an expert’s decision making and action they are fused. In Figure 10.1, this is illustrated by overlapping ovals representing the different forms of knowledge described in previous sections. Our further investigation into the nature of adult thinking and wisdom revealed that typical of actions regarded as wise is *integrative thinking* by which an individual makes connections, reconciliations and syntheses of different, even opposite, perspectives in order to find solutions to complex problems. For this reason, integrative thinking and *problem solving* are depicted as core processes in wisdom related to professional practice and expertise. The third core process is *socially responsible action and interaction for the common good*, which is required in solving professional problems that typically involve ethical dilemmas. This component of the model reflects our understanding of wisdom not only as an individual phenomenon but also as a highly social one.

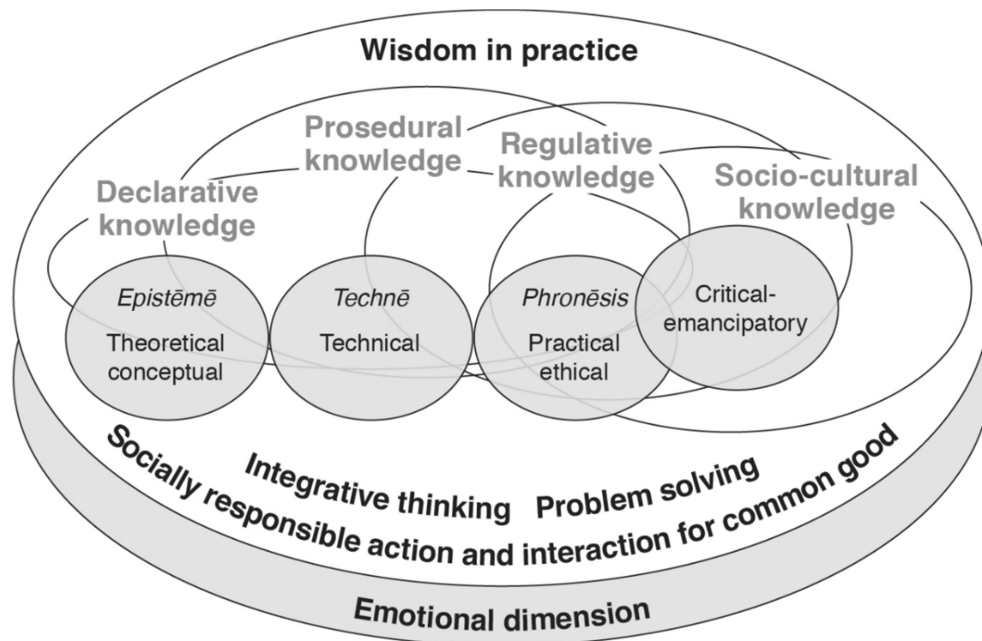


Figure 10.1. Integrative model of wisdom in professional practice and expertise.

Neither the Aristotelian interpretation of knowledge nor modern expertise research have taken the emotional sphere of human life into account. In recent conceptualisations, assumptions of wisdom have been broadened to include emotions and motivation (Staudinger

& Glück, 2011; Ardel, 2003). Similarly, in research on learning (e.g., Pekrun & Linnenbrink-Garcia, 2014), adult development (e.g., Labouvie-Vief, 1990, 2015) and professional development (e.g., Aarto-Pesonen & Tynjälä, 2017), the role of emotions has received significant attention. Thus, *emotions* are included in our model as an essential element.

While the mainstream of research on expertise, as well as on adult thinking and wisdom, has treated these matters as individual phenomena, we argue that – in this world facing highly complex problems such as climate change, a growing population, economic turbulences and wars – we need a wider perspective. We need research that goes beyond individual cognitive processes and sees expert thinking as a part of a holistic system of a psychological, social and physical world. Thus, not only thinking but also *socially responsible action and interaction* are included in our model of Wisdom in Professional Practice and Expertise. We argue that, nowadays, real experts are those individuals who pursue global responsibility and support the well-being of others rather than focusing on pure epistemic, technical or economic aspects in their work.

An important implication of our analysis is the importance of examining professionals' thinking from the *wisdom* point of view and in relation to action and the social and ecological environment, and as an interaction rather than an isolated individual cognitive activity. For this purpose, we think that a useful framework could be provided by the Practice theory (Heikkinen et al., 2018), where expert thinking is seen as an essential element of practices and – in an ideal case – of *praxis*, contributing positively and meaningfully to society and acting in the interests of humankind; that is, “to live well in a world worth living in” (Kemmis, Wilkinson, Edwards-Groves, Hardy, Grootenboer, & Bristol, 2014, p. 27).

## References

- Aarto-Pesonen, L., & Tynjälä, P. (2017). The core of professional growth in work-related teacher education. *The Qualitative Report*, 22(12), 3334–3354.
- Ardelt, M. (2003). Empirical assessment of a three-dimensional wisdom scale. *Research on Aging*, 25(3), 275–324.
- Aristotle. (2011). *Aristotle's Nicomachean Ethics* (R. C. Bartlett & S. D. Collins, Trans.). Chicago, IL: University of Chicago Press. (Original work published ca. 350 BCE)
- Baltes, P. B., & Staudinger, U. M. (2000). Wisdom: A metaheuristic (pragmatic) to orchestrate mind and virtue toward excellence. *American Psychologist*, 55(1), 122–136.
- Bangen, K. J., Meeks, T. W., & Jeste, D. V. (2013). Defining and assessing wisdom: A review of the literature. *The American Journal of Geriatric Psychiatry*, 21(12), 1254–1266.
- Bereiter, C. (2002). *Education and mind in the knowledge age*. Mahwah, NJ: Erlbaum.
- Bereiter, C., & Scardamalia, M. (1993). *Surpassing ourselves: An inquiry into the nature and implications of expertise*. Chicago, IL: Open Court.
- Borawski, D. (2017). Supporting the development of wisdom: The dialogical perspective. *Roczniki Psychologiczne/Annals of Psychology*, 20(3), 563–578.
- Boshuizen, H. P. A., Bromme, R., & Gruber, H. (Eds.). (2004). *Professional learning: Gaps and transitions on the way from novice to expert*. Dordrecht, the Netherlands: Kluwer Academic Publishers.
- Chi, M. T. H., Glaser, R., & Farr, M. J. (Eds.) (1988). *The nature of expertise*. Hillsdale, NJ: Erlbaum.
- Curnow, T. (1999). *Wisdom, intuition and ethics* (Avebury series in philosophy). Aldershot, England: Ashgate.
- Curnow, T. (2010). *Wisdom in the ancient world*. London, England: Duckworth.
- Curnow, T. (2015). *Wisdom: A history*. London, England: Reaktion Books.
- Davidson, A. I. (1995). Introduction: Pierre Hadot and the spiritual phenomenon of ancient philosophy (M. Chase, Trans.). In P. Hadot: *Philosophy as a way of life: Spiritual exercises from Socrates to Foucault* (pp. 1–45). Malden, MA: Blackwell.
- Denzin, N. K., & Lincoln, Y. S. (2005). Part II: Paradigms and perspectives in contention. In N. K. Denzin & Y. S. Lincoln (Eds.), *The SAGE handbook of qualitative research* (3<sup>rd</sup> ed., pp. 183–190). Thousand Oaks, CA: SAGE.
- Engeström, Y. (2004). The new generation of expertise. Seven theses. In H. Rainbird, A. Fuller, & A. Munro (Eds.), *Workplace learning in context* (pp. 145–165). London, England: Routledge.

Eraut, M. (2004). Transfer of knowledge between education and workplace settings. In H. Rainbird, A. Fuller, & A. Munro (Eds.), *Workplace learning in context* (pp. 201–221). London, England: Routledge.

Ericsson, K. A. (2006). The influence of experience and deliberate practice on the development of superior expert performance. In K. A. Ericsson, N. Charness, P. J. Feltovich, & R. R. Hoffman (Eds.), *The Cambridge handbook of expertise and expert performance* (pp. 683–703). Cambridge, England: Cambridge University Press.

Ericsson, K. A., Charness, N., Feltovich, P. J., & Hoffman, R. R. (Eds.). (2006). *The Cambridge handbook of expertise and expert performance*. Cambridge, England: Cambridge University Press.

Feltovich, P. J., Prietula, M. J., & Ericsson, K. A. (2006). Studies of expertise from psychological perspectives. In K. A. Ericsson, N. Charness, P. J. Feltovich, & R. R. Hoffman (Eds.), *The Cambridge handbook of expertise and expert performance* (pp. 41–67). Cambridge, England: Cambridge University Press.

Grossmann, I. (2017). Wisdom in context. *Perspectives on Psychological Science*, 12(2), 233–257.

Habermas, J. (1972). *Knowledge and human interests* (J. J. Shapiro, Trans.). Boston, MA: Beacon Press.

Hadot, P. (1995). *Philosophy as a way of life: Spiritual exercises from Socrates to Foucault* (A. Davidson, Ed., M. Chase, Trans.). Malden, MA: Blackwell.

Hakkarainen, K., Palonen, T., Paavola, S., & Lehtinen, E. (2004). *Communities of networked expertise: Professional and educational perspectives* (Advances in learning and instruction series, Sitra's publication series No. 257). Amsterdam, the Netherlands: Elsevier.

Harteis, C., & Billett, S. (2013). Intuitive expertise: Theories and empirical evidence. *Educational Research Review*, 9, 145–157.

Hatano, G., & Oura, Y. (2003). Commentary: Reconceptualizing school learning using insight from expertise research. *Educational Researcher*, 32(8), 26–29.  
doi:10.3102/0013189X032008026

Heikkinen, H., de Jong, F. P., & Vanderlinde, R. (2016). What is (good) practitioner research? *Vocations and Learning*, 9(1), 1–19.

Heikkinen, H., & Huttunen, R. (2017). “Mitä järkeä?” Kasvatuksen tietoperusta ja rationaalisuus [“What’s the sense?” The knowledge base and rationality of education]. In A. Toom, M. Rautiainen, & J. Tähtinen (Eds.), *Toiveet ja todellisuus: Kasvatus osallisuutta ja oppimista rakentamassa* [Hopes and reality: Education in constructing participation and learning] (Kasvatusalan tutkimuksia No. 75, pp. 31–58). Turku, Finland: Suomen kasvatustieteellinen seura.

Heikkinen, H., Kiilakoski, T., Huttunen, R., Kaukko, M., & Kemmis, S. (2018). Koulutustutkimuksen arkkitehtuurit [Architectures of educational research]. *Kasvatus*, 49(5), 368–383.

- Integrate. (2019). In *Online Etymological Dictionary*. Retrieved from [https://www.etymonline.com/word/integrate#etymonline\\_v\\_9377](https://www.etymonline.com/word/integrate#etymonline_v_9377)
- Kallio, E. (1998). *Training of students' scientific reasoning skills* (Doctoral dissertation, University of Jyväskylä, Faculty of Social Sciences, Jyväskylä, Finland).
- Kallio, E. (2001). Reflections on the modern mass university and the question of the autonomy of thinking. In J. Välimaa (Ed.), *Finnish higher education in transition: Perspectives on massification and globalisation* (pp. 73–90). Jyväskylä, Finland: University of Jyväskylä.
- Kallio, E. (2011). Integrative thinking is the key: An evaluation of current research into the development of adult thinking. *Theory & Psychology, 21*(6), 785–801.
- Kallio, E. (2015). From causal thinking to wisdom and spirituality: Some perspectives on a growing research field in adult (cognitive) development. *Approaching Religions, 5*(2), 27–41. doi 10.30664/ar.67572
- Kemmis, S., & Smith, T. J. (2008). Praxis and praxis development: About this book. In S. Kemmis & T. J. Smith (Eds.), *Enabling praxis: Challenges for education* (Pedagogy, education and praxis No. 1, pp. 3–13). Rotterdam, the Netherlands: Sense Publishers.
- Kemmis, S., Wilkinson, J., Edwards-Groves, C., Hardy, I., Grootenboer, P., & Bristol, L. (Eds.). (2014). *Changing practices, changing education*. Singapore, the Republic of Singapore: Springer.
- King, P. M., & Kitchener, K. S. (1994). *Developing reflective judgment: Understanding and promoting intellectual growth and critical thinking in adolescents and adults* (The Jossey-Bass higher and adult education series, The Jossey-Bass social and behavioral science series). San Francisco, CA: Jossey-Bass.
- Kitchener, K. S., King, P. M., & DeLuca, S. (2006). The development of reflective judgment in adulthood. In C. Hoare (Ed.), *Handbook of adult development and learning* (pp. 73–98). New York, NY: Oxford University Press.
- Kramer, D. A. (1983). Post-formal operations? A need for further conceptualization. *Human Development, 26*(2), 91–105.
- Kunzmann, U., & Stange, A. (2007). Wisdom as a classical human strength: Psychological conceptualizations and empirical inquiry. In A. D. Ong & M. H. M. van Dulmen (Eds.), *Oxford handbook of methods in positive psychology* (Series in positive psychology, pp. 306–322). New York, NY: Oxford University Press.
- Labouvie-Vief, G. (1990). Wisdom as integrated thought: historical and developmental perspectives. In R. J. Sternberg (Ed.), *Wisdom: Its nature, origins, and development*. Cambridge, England: Cambridge University Press.
- Labouvie-Vief, G. (2015). *Integrating emotions and cognition throughout the lifespan*. New York, NY: Springer.



- Law, A., & Staudinger, U. M. (2016). Eudaimonia and wisdom. In J. Vittersø (Ed.), *Handbook of eudaimonic well-being* (International handbooks of quality-of-life, pp. 135–146). Cham, Switzerland: Springer.
- Le Maistre, C., & Paré, A. (2006). A typology of the knowledge demonstrated by beginning professionals. In P. Tynjälä, J. Välimaa, & G. Boulton-Lewis (Eds.), *Higher education and working life: Collaborations, confrontations and challenges* (pp. 103–113). Oxford, England: Elsevier.
- Lehtinen, E. (2002). Developing models for distributed problem-based learning: Theoretical and methodological reflection. *Distance Education, 23*(1), 109–117.
- Mahon, K., Heikkinen, H. L. T., & Huttunen, R. (2018). Critical educational praxis in university ecosystems: enablers and constraints. *Pedagogy, Culture & Society, 27*(3), 463–480. doi: 10.1080/14681366.2018.1522663
- Marchand, H. (2002). Some reflections on postformal stage. *Behavioral Development Bulletin, 11*(1), 39–46.
- McEwan, I. (2001). *Atonement*. London, England: Cape.
- Paletz, S. B. F., Bogue, K., Miron-Spektor, E., & Spencer-Rodgers, J. (2018). Dialectical thinking and creativity from many perspectives: Contradiction and tension. In J. Spencer-Rodgers & K. Peng (Eds.), *The psychological and cultural foundations of East Asian cognition: Contradiction, change, and holism* (pp. 267–308). New York, NY: Oxford University Press.
- Pekrun, R., & Linnenbrink-Garcia, L. (Eds.). (2014). *International handbook of emotions in education* (Educational psychology handbook series). New York, NY: Routledge.
- Salo, P. & Heikkinen, H. L. T. (2018). Slow Science: Research and teaching for sustainable praxis. *Confero, 6*(1), 87–111. doi:10.3384/confero.2001-4562.181130
- Saugstad, T. (2005). Aristotle's contribution to scholastic and non-scholastic learning theories. *Pedagogy, Culture & Society, 13*(3), 347–366.
- Stark, R., Gruber, H., Hinkofer, L., & Mandl, H. (2004). Overcoming problems of knowledge application and transfer: Development, implementation and evaluation of an example-based instructional approach in the context of vocational school training in business administration. In H. P. A. Boshuizen, R. Bromme, & H. Gruber (Eds.), *Professional learning: Gaps and transitions on the way from novice to expert* (pp. 49–70). Dordrecht, the Netherlands: Kluwer Academic Publishers.
- Staudinger, U. M., & Glück, J. (2011). Psychological wisdom research: Commonalities and differences in a growing field. *Annual Review of Psychology, 62*, 215–241.
- Sternberg, R. J. (1998). A balance theory of wisdom. *Review of General Psychology, 2*(4), 347–365.
- Swartwood, J. D. (2013). Wisdom as an expert skill. *Ethical Theory and Moral Practice, 16*(3), 511–528.

- Swartwood, J., & Tiberius, V. (2019). Philosophical foundations of wisdom. In R. J. Sternberg & J. Glück (Eds.), *The Cambridge handbook of wisdom* (pp. 10–39). New York, NY: Cambridge University Press.
- Tynjälä, P. (2008). Perspectives into learning at the workplace. *Educational Research Review*, 3, 130–154.
- Tynjälä, P. (2009). Connectivity and transformation in work-related learning: Theoretical foundations. In M.-L. Stenström & P. Tynjälä (Eds.), *Towards integration of work and learning: Strategies for connectivity and transformation* (pp. 11–37). Dordrecht, the Netherlands: Springer.
- Tynjälä, P., & Gijbels, D. (2012). Changing world: Changing pedagogy. In P. Tynjälä, M.-L. Stenström, & M. Saarnivaara (Eds.), *Transitions and transformations in learning and education* (pp. 205–222). Dordrecht, the Netherlands: Springer Netherlands.
- Tynjälä, P., Häkkinen, P., & Hämäläinen, R. (2014). TEL@work: Toward integration of theory and practice. *British Journal of Educational Technology*, 45(6), 990–1000.
- Tynjälä, P., Virtanen, A., Klemola, U., Kostiainen, E., & Rasku-Puttonen, H. (2016). Developing social competence and other generic skills in teacher education: applying the model of integrative pedagogy. *European Journal of Teacher Education*, 39(3), 368–387. doi:10.1080/02619768.2016.1171314
- van Someren, M. W., Reimann, P., Boshuizen, H. P. A., & de Jong, T. (Eds.). (1998). *Learning with multiple representations* (Advances in learning and instruction series). Amsterdam, the Netherlands: Pergamon.
- Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity* (Learning in doing: Social, cognitive, and computational perspectives). Cambridge, England: Cambridge University Press.
- Wenger-Trayner, E., Fenton O’Creevy, M., Hutchinson, S., Kubiak, C., & Wenger-Trayner, B. (Eds.). (2015). *Learning in landscapes of practice: Boundaries, identity, and knowledgeability in practice-based learning*. London, England: Routledge.
- Wennerberg, H. (1967). The concept of family resemblance in Wittgenstein's later philosophy. *Theoria*, 33(2), 107–132.
- Yang, S. (2017). The complex relations between wisdom and significant life learning. *Journal of Adult Development*, 24(4), 227–238.