



Review article

Utilising previous professional expertise by second-career teachers: Analysing case studies using the lens of transfer and adaptive expertise

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ABSTRACT

Second-career teachers (SCTs) may contribute to quality of education by utilising their previous professional expertise (PPE). However, case studies show contradictory examples of beneficial and hindering influence of apparently similar PPE while SCTs become proficient in their new teaching job. Aiming to understand beneficial or hindering utilisation of PPE, this qualitative literature study applies concepts of transfer and adaptive expertise as lens to analyse 41 case studies reporting on utilisation of PPE by SCTs. Results suggest that adaptive expertise developed during previous career impacts beneficial utilisation of PPE, while support for utilising PPE is often perceived as insufficient.

In many countries, education is witnessing an influx of second-career teachers (SCTs). Not only is this important to alleviate teacher shortages (Cuddapah & Stanford, 2015; UNESCO, 2020), but the previous professional expertise (PPE) acquired by these professionals, such as real-world knowledge and organisational skills, can also be beneficial in their new work environment (Powers, 2002; Rinnooy Kan, 2007; Tigchelaar et al., 2010; Trent, 2018). PPE may equip SCTs with skills to become effective teachers, such as the ability to cope with adversity (Kahn, 2015), or skills that are important to make a contribution to the wider school organisation, such as leadership skills (Chambers, 2002; Powers, 2002). However, PPE can also be hindering for SCTs while they become proficient in their new teaching position. PPE may disrupt SCTs' adaptation to their new profession—e.g. “first year was a challenge; she was accustomed to being the boss” (Poole, 2018, p. 92)—or, when not recognised, add to frustration and reduced commitment to teaching—e.g. “frustrated by the limited recognition of her competence and experiences ... her commitment to secondary education [dampened]” (Watters & Diezmann, 2015, p. 180).

Research has not yet clarified why utilising PPE is sometimes reported as beneficial and at other times as hindering. Moreover, PPE sometimes shows seemingly contradictory impact when utilised by SCTs within the teacher profession. For instance, Johnson (2018) reports on an SCT with a military background who refers to his PPE as beneficial for classroom management, as procedures from the military prevented discipline problems, whereas Rubalcaba (2018) writes about an SCT with a similar military background whose PPE in maintaining order and

discipline was hindering for effective classroom management.

The aim of this study is to gain a better understanding of beneficial and hindering utilisation of PPE as reported by SCTs for their new responsibilities within the teaching profession. To achieve this, we use the concepts of transfer and adaptive expertise as lens to analyse case studies reporting on SCTs' utilisation of PPE, in which transfer (of expertise) refers to the process of utilising expertise developed in a previous domain in the new (teaching) domain (see e.g. Bransford et al., 2000) and adaptive expertise to the capability to adapt PPE to new circumstances (see e.g. Eraut, 2009). The case studies were identified through a systematic search of the literature. This study will focus on SCTs in secondary education, as their prior education and career generally aligns with the subject matter of their teaching, and therefore their PPE might be regarded as beneficial (Depaepe et al., 2015).

We first identify theoretical concepts related to transfer of expertise which we use as lens in this paper. Next, we use these concepts to analyse case studies reporting on utilisation of PPE by SCTs in secondary education to gain a better understanding of beneficial and hindering utilisation of PPE as reported by SCTs, which may contribute to teacher education and coaching aimed at SCTs.

1. Theoretical framework

To utilise transfer of expertise as lens to analyse the influence of PPE on SCTs' performance in their new job, an understanding is needed of this concept, and how and under which conditions transfer of expertise

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occurs. Well-known definitions of ‘transfer’ (of expertise) carry the notion that performance on tasks in one work domain affects performance on tasks in a new work domain and/or within a different context (Bransford et al., 2000; Detterman & Sternberg, 1993; Gick & Holyoak, 1987; Kimball & Holyoak, 2000), while ‘expertise’ can be defined as the characteristics, skills and knowledge needed to perform a task (Ericsson, 2018). However, research has shown that a high level of task performance in one domain is not predictive of task performance in another domain (Chi et al., 2014; Feltoich et al., 2018; Ritchhart & Perkins, 2005, pp. 775–802). As conditions in the new (teaching) domain will (most likely) be different from the prior domain, transferred PPE then needs to be adapted before it can become effective for which adaptive expertise is required (Bohle Carbonell & van Merriënboer, 2019; Eraut, 2009). Alternatively, when transfer is interpreted as a learning process (Bransford et al., 2000; Eraut, 2009; Kimball & Holyoak, 2000; Mayer & Wittrock, 1996), expertise in a previous domain may become apparent in better and faster learning of tasks performed in a new domain (Billett, 2001; Broudy, 2017; Schwartz et al., 2005). This would be regarded as positive transfer (Bransford & Schwartz, 1999) and will be referred to as *beneficial* influence of PPE. Conversely, negative transfer may occur if transferring what was learned in an earlier context undermines performance in the new context or hinders new learning (see, for example, Bransford & Schwartz, 1999; Chen & Daehler, 1989; Dori & Sasson, 2013) and will be referred to as *hindering* influence. Gaining understanding which characteristics of PPE contribute to positive or negative transfer may help to encourage positive transfer while minimising impact of negative transfer.

1.1. Conditions for transfer

In literature related to transfer of expertise, several conditions can be identified that play a role in utilising expertise in a new context and which affect the beneficial or hindering influence (Barnett & Ceci, 2002; Bransford & Schwartz, 1999; Broudy, 2017; Detterman & Sternberg, 1993; Eraut, 2009; Hatano & Inagaki, 1984; Ward et al., 2018; Wilkins & Comber, 2015). These conditions are related to similarity between the original and the new task (near-far transfer), level of abstractness of knowledge, the level to which expertise can be classified as routine or adaptive, and the level of support from the environment for the transfer process. Below, these conditions will be discussed in greater detail.

1.1.1. Near-far transfer

A first condition for transfer of expertise is the level of similarity between the original task and the new task. Transfer between similar tasks is referred to as ‘near transfer’, whereas transfer between tasks that are less similar is referred to as ‘far transfer’ (Detterman & Sternberg, 1993). When an SCT’s PPE can be considered as near, transfer is more likely to occur (Barnett & Ceci, 2002; Ritchhart & Perkins, 2005, pp. 775–802). In classifying transfer as near or far, most literature primarily considers domain aspects (e.g. medical vs. teaching domain) (e.g. Chi et al., 2014; Detterman & Sternberg, 1993; Ericsson et al., 2018; Ward et al., 2018), while some also considers task content to be critical (e.g. training clients vs. teaching adolescents) (Barnett & Ceci, 2002; Dori & Sasson, 2013). Within this context, it is relevant to note that in classifying PPE as near or far, the widely used concepts of domain and similarity are both ill-defined (Barnett & Ceci, 2002; Chi, 2006; Guberman & Greenfield, 1991; van der Heijden, 2000). Nevertheless, professionals coming from other domains will more likely attempt to transfer their PPE when they perceive a new situation or task is near or similar to a familiar situation or task (Gick & Holyoak, 1987; Kimball & Holyoak, 2000). Supporting experts to correctly assess similarities between original and new tasks is recognised as an important step in producing transfer of expertise (Detterman & Sternberg, 1993).

1.1.2. Knowledge representation

A second condition related to transfer is the level of abstractness of

knowledge which enables the expert to go beyond visual similarities to identify underlying structural similarities within the new context or task (Bransford & Schwartz, 1999; Chi et al., 1981).

In literature, a distinction is made between procedural knowledge, declarative (or conceptual) knowledge, and tacit knowledge (Ackerman, 2020; Polanyi, 2009, 2013; Ryle, 2009). Procedural knowledge refers to specific skills, but also to routine execution during complex tasks (Ackerman, 2020; Hoffman, 1998). Declarative knowledge relates to knowledge of facts, but also includes “concepts, principles, ideas, schemas, and theories” (Chi & Ohlsson, 2005, p. 371). Tacit knowledge refers to knowledge which is difficult to articulate or to verbalise and is believed to develop through educational and cultural experiences while not being directly trained. This type of knowledge is deemed particularly important in solving unknown problems that are not explicitly articulated within the procedural or declarative knowledge areas (Ackerman, 2020; Broudy, 2017).

Procedural knowledge is primarily obtained within the professional context after sufficient practice on the job and is therefore considered domain-specific and hardly transferrable (Ackerman, 2020; Broudy, 2017; Chi & Ohlsson, 2005; Ericsson et al., 1993). For SCTs, declarative knowledge will mostly coincide with the subject matter of their teaching (Diezmann & Watters, 2015). However, for effective teaching, this content knowledge (CK) needs to be complemented with pedagogical content knowledge (PCK), which is knowledge about how to teach the subject (Depaepe et al., 2015; Shulman, 1986). In addition, development of expertise involves “a progression ... to an articulated, conceptual, and principled understanding” (Hoffman, 1998, p. 84), which results in a shift from explicit knowledge towards tacit, abstract knowledge (Hoffman, 1998; Reber, 1989). Abstract knowledge representation allows a person to distinguish between problems which are conceptually different yet may appear the same (or vice versa) (Billett, 2001; Hoffman, 1998; Murphy & Wright, 1984). When experts are trying to understand a problem conceptually, their tacit knowledge is involved to a greater extent to form a deeper, more appropriate understanding compared to non-experts. Based on this deeper understanding, they select the relevant procedural and/or declarative knowledge to process the problem further (Chi et al., 1981; Murphy & Wright, 1984).

Hindering utilisation of prior knowledge (negative transfer) occurs when expertise is used to solve a problem that appears similar to a known problem but is actually structurally different. Hence, for SCTs to utilise existing knowledge beneficially in the new context, they need to correctly understand the conceptual differences between the new context and their previous context, which is believed to be facilitated by their abstract and tacit knowledge base (Broudy, 2017; Chi et al., 1981; Larkin, 1989), e.g. models for conflict resolution from previous careers which are adapted to deal with classroom management issues (Haim & Amdur, 2016).

1.1.3. Routine-adaptive expertise

When transferring expertise, the new context or task will most likely differ from the original context or task. Therefore, the transferred expertise requires adaptation to the changed circumstances (Eraut, 2009), for which adaptive expertise, defined as “the ability to perform at a high level in unfamiliar situations” (Bohle Carbonell & van Merriënboer, 2019, p. 263), might be needed.

An expert is generally defined as someone whose performance in completing the task in which he or she is an expert is consistently better than that of others (Cianciolo et al., 2006; Ericsson & Smith, 1991; Ward et al., 2018). An expert’s expertise is obtained through extensive (deliberate) practice (Ackerman, 2020; Ericsson et al., 1993) or deliberate performance (Fadde & Klein, 2010). In identifying experts, some stress superior performance per se (Ericsson et al., 1993); others stress performance and capabilities relative to the demands of the environment (Cianciolo & Sternberg, 2018), while still others focus on better and more reliable performance when expertise matters most—i.e. when dealing with more difficult, non-routine tasks within a domain (Billett, 2001; Ward et al., 2018).

In literature, a distinction is made between routine and adaptive expertise. Routine experts are defined as “outstanding in terms of speed, accuracy and automaticity of performance, but lack flexibility and adaptability to new problems” (Hatano & Inagaki, 1984, p. 31). Adaptive experts are “those who not only perform procedural skills efficiently but also understand the meaning of the skills and nature of their object” (Hatano & Inagaki, 1984, p. 28). Adaptive expertise is essential to cope with changing job tasks and work methods or deal with more difficult, non-routine problems within a domain where adaptation may be required (Bohle Carbonell et al., 2016; Ward et al., 2018). As most SCTs change their work domain to become a teacher, utilising PPE in a beneficial way may require adaptation of that expertise to the changed circumstances, for which adaptive expertise, as obtained in their earlier domain, may be needed (Bohle Carbonell et al., 2014; Hatano & Inagaki, 1984; Ward et al., 2018).

1.1.4. Support from new context

Support for SCTs is not only essential for their development during the first years of teaching (Ruitenburg & Tigchelaar, 2021) but also for successful transfer of PPE. This success is influenced by the time, effort, and commitment available to facilitate such transfer (Eraut, 2009; Yelon, 1992), which starts with the school organisation being open to change and acknowledging the value of new knowledge (Vermeulen, 2016; Yelon, 1992). Such support requires recognition of earlier skills acquired by SCTs (Powers, 2002; Wilkins & Comber, 2015), as a lack (or absence) of recognition disregards potential added value. Also, lack of recognition hampers the SCT being acknowledged as a professional, which can complicate or even harm an SCT’s integration within the new context (Wilkins & Comber, 2015). If SCTs are made aware of the general value of their skills and encouraged to distinguish situations where these can be applied, then SCTs are more likely to utilise their PPE (Kimball & Holyoak, 2000; Yelon, 1992). Being able to consult more experienced colleagues and receiving feedback on actions will assist in understanding which knowledge and skills are relevant and the situational adaptation needed (Eraut, 2009). The need for support varies per SCT and is, amongst other things, dependent on the nature of their PPE. For instance, in situations correctly estimated as being close to their previous experience, learning the new task can be quick or easy, while for more complex situations, it will be longer and/or challenging (Eraut, 2009).

1.2. The present study

Since the theoretical concepts presented above are applicable to the process of transfer and adaptation of PPE by SCTs, we use these as lens to study reports on utilisation of earlier expertise of SCTs in secondary education. The lens consists of characteristics of PPE (near/far, routine/adaptive), descriptions of PPE used in the new context (knowledge used and beneficial/hindering influence within/outside the classroom), and the role attributed to support for transferring the PPE. It will assist us in gaining a better understanding of aspects facilitating beneficial or hindering utilisation of PPE by SCTs as reflected in the authentic accounts of SCTs in qualitative case studies obtained from a literature review.

The following research questions guide our review of case studies in which SCTs report on utilising PPE:

1. How can near/far and routine/adaptive PPE characteristics be recognised in SCTs’ descriptions?
2. How is transfer of PPE described in terms of knowledge used and beneficial/hindering influence?
3. How do SCTs characterise the support received for transfer of their PPE?

2. Method

To answer the research questions, we conducted a qualitative systematic literature review of case studies in which SCTs report on

utilisation of PPE as we believe the richness of personal cases will provide sufficient details to better understand when PPE results in beneficial or hindering utilisation. In a qualitative literature review, findings from qualitative studies are integrated to explore themes across those studies (M. J. Grant & Booth, 2009).

2.1. Data collection

While studying literature for theoretical concepts related to the lens of transfer of expertise, various case studies were identified in which SCTs reported on the utilisation of PPE; these were expanded on using snowballing and citation searching techniques. To understand whether and how the theoretical concepts would emerge from such case studies, a preliminary search was conducted in October 2020 using a first set of search terms, in which 95 publications resulted in 26 selected case studies. Comparing these results with the studies already identified enabled optimisation of the search terms (e.g. the term ‘case study’ or ‘case studies’ proved unreliable to search for case studies, as this is not always explicitly mentioned). The final set of search terms consisted of a fixed part (focusing on SCTs) combined with variable terms (focusing on PPE). The fixed part was defined as “second-career teacher” OR “second-career teachers” OR “change-of-career teacher” OR “change-of-career teachers” OR “career changer” OR “career changers”.¹ The variable terms were combinations of an adjective (early, earlier, prior, previous, initial, preceding, past; *plus* work, life) and a noun in its singular and plural forms (experience(s), expertise, skill(s), knowledge, proficiency/ies, accomplishment(s), competence(s)). An example of a complete search term is: (“earlier experience” OR “earlier experiences”) AND (“second-career teacher” OR “second-career teachers” OR “change-of-career teacher” OR “change-of-career teachers” OR “career changer” OR “career changers”). To retrieve relevant studies, searches were conducted using Google Scholar, which allows a full text search through journal articles, dissertations, books, abstracts, and so on (Cornell University Library, 2021). Given the aim of this study, an adequate level of data saturation was considered more important than finding as many studies as possible. For this purpose, Google Scholar results were (initially) considered sufficient as more dedicated databases (e.g. PsycINFO, Scopus, and Web of Science) hardly add any additional material (see, for example, Ruitenburg & Tigchelaar, 2021). The search was limited to articles published in 2010–2020 and was conducted in January 2021. To confirm the soundness of case studies derived from the search, we looked for data saturation during the analysis, where “no new or relevant information seems to emerge pertaining to a category, and the category development is well established” (Onwuegbuzie et al., 2012, p. 13). A sufficient level of data saturation became apparent during the analysis of the final articles of the selected case studies, as the recorded references to the transfer of expertise themes were similar to findings in earlier articles without providing new and relevant information to already well populated categories.

After removing duplicates and non-educational articles, the search resulted in a total of 1591 publications (see supplementary data, Appendix B; Table B3 ff). For inclusion we looked for articles with primary focus on SCTs working in secondary education in which they reported on influence of their PPE (so excluding e.g. articles focusing on teacher identity, teacher education, retention, etc.). For this we examined title and abstract and, in case of uncertainties, also Method and Results sections. This resulted in 61 selected articles which were further screened on availability and, using full text examination, on usability of data (e.g. some articles reported on SCTs mixed with other participants, or focused on the influence of PPE on non-teaching aspects such as future careers, or reported only preliminary results). This resulted in the final list of 41 articles (see Appendix B; Table B1). Three pairs of articles

¹ The latter part resulted in the inclusion of non-education articles, which were filtered out during the selection process.

used the same dataset; for each pair, descriptives (e.g. number of participants) were used only once in the Results section while the qualitative content (e.g. remarks of SCTs) of both articles was used during data analysis. The final list included 22 articles published in peer-reviewed journals, 14 dissertations, one article contained in a book, and four conference papers, of which the latter were included to supplement findings (Scherer & Saldanha, 2019) (for details, see Appendix B; Table B1).

The final set of 41 publications consisted of 38 unique datasets. The datasets contained case studies reporting on a total of 409 participants. Group sizes varied between 1 and 30 participants, with an average of 11 participants and a median of 5.5. Almost all studies included participants with fewer than five years' teaching experience. Nearly all studies relied on (a series of) interviews with participants, although one study relied on online descriptive journals produced by the SCTs as documentary proof of their experiences. About a third combined these interviews with other data collection methods such as focus groups, journals, (video) observations, surveys, and relevant artifacts. Fewer than ten studies combined qualitative methods with quantitative techniques; we only used the qualitative interview results. All studies reported on the influence of PPE on the new career of the SCT, although none of the studies seemed to focus on understanding *why* (characteristics of) PPE resulted in this influence.

2.2. Data analysis

For the analysis, the concepts related to transfer of expertise were operationalised based on characteristics found in the literature (e.g. what constitutes routine expertise: focusing on flawless execution, less concerned with concepts, etc.). This was needed, as none of the case studies was designed to understand the influence of PPE through the lens of transfer of expertise. This operationalisation (provided in Appendix B; Table B2) was further detailed during the preliminary search in October 2020 to understand how the various themes were reflected in SCTs' descriptions of their PPE as found in those case studies. This text mining exercise (see Onwuegbuzie et al., 2012), for each of the aspects of the theoretical lens, resulted in keywords and examples (e.g. routine expertise, with keywords 'unable to adjust' and example 'unable to adjust to needs of student').

The operationalisation enabled within-study analysis of each article by looking for descriptions in the text related to these themes and classifying them accordingly (e.g. comparing descriptions of earlier expertise to the 'far/near' category to estimate far or near transfer for domain and task). Findings were recorded per study (aggregated at study level) in uniform reporting tables using quotes from the studies. Also, details such as prior work domain and types of earlier expertise were noted in these reporting tables. Microsoft Excel was used to collect summary information from the reporting tables and descriptives from the case studies, such as number of participants, country of origin, years of experience of SCTs (prior and within education), and so on.

After the within-study analyses, a between-study analysis was performed to understand to what extent the themes of the theoretical framework emerged from these 41 studies. For this, the reporting tables per study were grouped in tables according to each identified theme.

The between-study results triggered a third analysis to examine an emerging pattern at study level between routine/adaptive expertise and beneficial/hindering utilisation. During this third analysis, we looked within those studies for quotes from individual participants for which both routine/adaptive expertise and beneficial/hindering utilisation were coded (we found this to be the case for 63 out of 409 participants). We used this analysis to understand whether this pattern was sustained at participant level.

To enhance reliability, two co-authors independently reviewed the operationalisation of the theoretical lens for clarity and theoretical soundness (Sargeant, 2012). Additionally, using this document, the two co-authors independently analysed six studies, after which results were compared and, in case of discrepancies, consensus was reached through

Table 1
Categories and subcategories occurrences at study level.

Category	# Studies	Subcategory	# Studies
Transfer	38	Far transfer domain	26
		Far domain/far task	11
		Far domain/far + near task	14
		Far domain/near task	1
		Near transfer domain	1
		Near domain/near task	1
		Far + near transfer domain	11
		Far + near domain/far + near task	11
		Expertise of SCT	37
Knowledge used	37	Adaptive expertise of SCT	34
		Procedural knowledge	21
		Declarative knowledge	28
Influence of PPE	38	Tacit knowledge	34
		Beneficial influence	36
		Within/outside classroom	34/22
		Hindering influence	19
Perceived support	31	Within/outside classroom	16/9
		Positive support	21
Expertise colleagues	25	Negative support	28
		Routine expertise colleagues	23
Acknowledgement	18	Adaptive expertise colleagues	6
		Positive acknowledgement	6
		Negative acknowledgement	17

Note. Results for 38 datasets. For detailed results, see Appendix A.

discussion, including adaptations to the operationalisation table such as clarified descriptions and keywords (Sargeant, 2012).

3. Results

In this section, we first present an overview of the type of expertise reported by SCTs to illustrate the diversity of PPE in the reviewed case studies. After this, descriptions of SCTs related to the theoretical concepts will be presented in the following order: (1) near/far transfer estimations; (2) routine/adaptive expertise characterisation; (3) representations of knowledge used by SCTs; (4) reported beneficial/hindering influence of PPE (within/outside classroom); and (5) support from the environment and its role in the transfer process. Table 1 presents a summary of how often categories occur in the selected case studies (e.g. indications for expertise of SCT were found in 37 studies, of which 14 studies showed routine expertise and 34 studies showed adaptive expertise). Detailed results for each study are available in Appendix A.

3.1. Type of expertise

Although most studies did not explicitly mention type of expertise, several groups of expertise could be identified, such as former military (Gordon & Newby Parham, 2019; Johnson, 2018; Price, 2019; Rubalcaba, 2018); subject matter experts (i.e. expert in their particular field, mostly their field of teaching) (Diezmann & Watters, 2015; Martin, 2018; Peter et al., 2011; Snyder, 2011; Watters & Diezmann, 2015); STEM² (Muller et al., 2014); and academic scholars (Kowalczyk-Walczyk, 2016). Grant (2016) compared previous expertise in management with consulting positions. Wagner and Imanel-Noy (2014) compared academics with three different backgrounds: general, military, and subject matter experts. The other studies included SCTs from many professional backgrounds and contained, in some form or another, SCTs' descriptions of their prior professional domains, responsibilities, and/or aspects of their previous expertise (Appendix B; Table B1). As reported beneficial and/or hindering influences of PPE was so widely distributed over all studies and hence across so many different types of

² Science, technology, engineering and mathematics.

expertise, the originating domain of SCTs' PPE per se does not seem to explain why PPE utilisation was sometimes reported as beneficial and other times as hindering.

3.2. Near/far transfer

For all studies, the near/far classification was recorded for PPE domain and task descriptions. The results showed that in the majority of case studies the prior domains were described by SCTs as unrelated to the teaching domain (far transfer of domain)—e.g. “finance” (Rowston et al., 2020, p. 688)—rather than studies in which the prior tasks were described as unrelated to teaching tasks (far transfer of task)—e.g. “international transport representative” (Tigchelaar, 2012, p. 62). This indicates that many SCTs describe (some of) their previous tasks as ‘near’ to the teaching task, even though their previous domain is described as ‘far’ from the teaching domain. For example, Snyder (2011) reported on a participant who had worked as a marine engineer and naval architect designing ships (considered far on domain and on task), but as part of her responsibilities she trained new engineers and company customers (considered near on task).

3.3. Routine/adaptive expertise

Using SCTs' descriptions of their previous expertise, indications of routine or adaptive expertise could be classified for almost all studies. In approximately one third of all studies, SCTs described elements of routine expertise, e.g. “I was used to teaching employees that were paid to sit there” (Poole, 2018, p. 115), while in almost all studies SCTs showed elements of adaptive expertise, e.g. “Change is common ..., and you have to be able to react” (Johnson, 2018, p. 79). In several studies, descriptions of both routine and adaptive expertise were found. These combined descriptions sometimes originated from differences between participants (see, for example, Varadharajan, 2014); sometimes it was reflected in a single participant—e.g. Martin (2018) reported on an SCT who had “strong convictions about what was developmentally appropriate for her students” (p. 94) (pointing towards routine expertise) while she “pursued many career choice development activities” (p. 90), which fits better with adaptive expertise.

SCTs' descriptions in terms of routine or adaptive expertise referred not only to their own expertise, but also to general perceptions and concerns or opinions of colleagues within the new context (district and school leaders, mentors, and colleagues). For example, comments indicated adaptive expertise such as “in my district, ...they want role contributors. People with world experience” (Rubalcaba, 2018, p. 126), or remarks pointed to routine expertise such as “teachers were suspicious of new approaches being introduced” (Watters & Diezmann, 2015, p. 178). Such comments were found in more than half of the studies (see Table 1). Almost all of these comments expressed a preference for maintaining routines in the environment, while only a quarter pointed to adaptive expertise.

3.4. Knowledge representation

In over half of the studies, SCTs reported applying earlier acquired procedural knowledge in the new context—e.g. “ability to plan and organise work commitments” (Hanington, 2018, p. 12) or “coping strategies [to deal with workload]” (Bar-Tal et al., 2019, p. 12). In many cases, this concerned more general skills such as time management and planning skills, which are applicable in most contexts. However, examples were also found where specific professional procedural skills was utilised when the task involved was described as ‘near transfer’ for the new environment. For example, a former psychologist “gained an understanding regarding her students' adjustment problems ... practicing her previous profession” (Aslan, 2016, p. 113), or “kids understood what the procedures in the classroom were, which I got from the military, and it was well-organised” (Johnson, 2018, p. 66).

SCTs reported using declarative knowledge in almost three quarters of the studies—e.g. “easiest thing for him had been the content and subject matter” (Douglas, 2011, p. 72). Although for most SCTs this form of knowledge closely relates to the subject matter they will be teaching—e.g. an SCT with a science degree in astrophysics and a previous career in construction now teaching physics (Varadharajan, 2014)—several SCTs reported challenges in translating this knowledge to teaching: for example, “he's very good at math, but as far as teaching math, he just wasn't able to manage it” (Poole, 2018, p. 119).

Use of tacit knowledge was evident in almost all studies, helping SCTs to deal with new situations both inside and outside the classroom. For example, “My business career taught me to ... build rapport with students as individuals” (Trent et al., 2014, p. 102), or “My other careers prepared me for the professionalism I have needed in addressing colleagues, difficult situations, and day to day organisation” (Harmon, 2018, p. 54), or “being able to ‘read’ the dynamics of an organisation ... to use relationships to their benefit” (R. Grant, 2016, p. 127).

3.5. Beneficial or hindering transfer

In almost all studies, SCTs reported beneficial influences of PPE. For instance, using her scientific background, an SCT was “able to draw on experience and narratives to engage students” (Watters & Diezmann, 2015, p. 180), a skill she felt was lacking among teachers without professional science experience. About half of the studies reported hindering influences—e.g. an SCT who “was accustomed to being the boss” (Poole, 2018, p. 92) found it difficult to be a newcomer.

Most of the reported beneficial influences were related to tasks and activities within the classroom. For example, a former project manager “wanted to show her pupils that economics is a real-life subject” which, in her eyes, helped to make a socially useful contribution (Tigchelaar, 2012, p. 66), or Kate³ described how “all that conflict resolution stuff that I did so much of in my previous job really helped me with difficult children” which enabled her to manage student behaviour (Varadharajan, 2014, p. 135). In over half of the studies, SCTs also reported benefits of PPE outside the classroom. For example, Tasfia experienced that “sharing her expertise and helping other teachers with the technology” was valued and enjoyable particularly as the expertise was appreciated (Varadharajan, 2014, p. 155), or, on leadership skills, Aaron indicated that “his previous career also provided the skills he needed leading teams, [such as the] bio team or physics team”, which was experienced as “tremendously helpful” (Kahn, 2015, p. 91).

Almost all studies that reported hindering influences included situations within the classroom. For example, Kathy felt “challenged by some of her students because of her former military status ... because they believed that she was too authoritative”, which complicated her classroom management and her transition into teaching (Rubalcaba, 2018, p. 141). About half of the studies that reported hindering influences also included tasks and activities outside the classroom. For example, Susan stated that “my biggest adjustment is, outside of my classroom, just being a nobody at the school”, which conflicted with her inclination to be in charge (Peter et al., 2011, p. 240).

Where PPE was mentioned explicitly related to beneficial or hindering influence, this was generally in terms of perceived similarity between previous and current tasks, thus indicating a near transfer of expertise. For example, as a beneficial influence, participants reported “experiencing continuity at the levels of behaviour and competencies in managing groups, because they had developed and used skills in working with teams” (Tigchelaar, 2012, p. 61); or, as a hindering influence, participants in Kowalczyk-Walczak's study (2016) mentioned intense challenges during their first years of teaching, as the “work of a school teacher was expected to be very similar to one of a university teacher ... [while] it turned out to be remarkably different” (p. 103).

³ All names are pseudonyms used in the case studies.

Table 2
Occurrences of influence and expertise at participant level.

Influence category	# Participants	Expertise category	# Participants
Beneficial influence	55	Adaptive expertise	47
		Routine expertise	13
Hindering influence	21	Adaptive expertise	9
		Routine expertise	15

Note. The results are for 63 participants within 26 studies for whom both influence and expertise could be coded.

The between-studies analysis indicated that beneficial influence was more frequently reported in combination with indications of adaptive expertise while hindering influence seemed more frequently reported with indications of routine expertise. To confirm this pattern at study level, an additional analysis was performed to link beneficial or hindering influence with routine or adaptive expertise at the participant level. In 26 studies, 63 participants' remarks about beneficial or hindering influence could be linked to those same participants' remarks indicating routine or adaptive expertise. The results indicated that most participants who reported beneficial influences talked about their expertise in adaptive terms (see Table 2). For example, in Harmon (2018), Jessica reported being motivated by "change, challenge and collaboration" (p. 55), indicating adaptive expertise, and mentioned as a beneficial influence that "other careers prepared me for the professionalism I have needed in addressing colleagues, difficult situations, and day to day organisation" (p. 75). About three quarters of participants who reported hindering influences mentioned comments indicating routine expertise (see Table 2). For example, in Gordon and Newby Parham (2019), Bonny mentioned "in the army ... you are told what to do" (p. 147), indicating a routine form of expertise, and continued about the hindering influence in her role as teacher: "... here I am in a field where I have to get creative" (p. 147).

Of SCTs who reported a beneficial influence, about a quarter made remarks indicating routine expertise (see Table 2). For example, in Diezmann and Watters (2015), Abi showed limited flexibility in approaching new situations with expertise contextualised to her previous professional domain (indication of routine expertise) while reporting a beneficial influence of her PPE as she "was able to supplement the core curriculum from her own experience" (p. 1528). A hindering influence of PPE with remarks on adaptive expertise was evident in slightly less than half of the participants (see Table 2). For example, in Watters & Diezmann, 2013, Natalie pursued open-ended problems in her previous job (indication of adaptive expertise) but expressed a hindering influence by lamenting, despite being a mathematics expert, "... how do I teach algebra; I don't know" (p. 9), which resulted in feelings of anxiety and tension.

3.6. Support

Comments by SCTs on support were found in nearly all studies. Almost all of these comments were negative reflections on support from colleagues, mentors, or the more general support structure. For example, Kate mentioned "you grab your help from people that are willing to give it ... and it usually wasn't the people I worked with" (Watters & Diezmann, 2013, p. 107). Mateo stated that his "mentor in his first year was just a name" (Rubalcaba, 2018, p. 126), while Rhonda voiced her frustration "with being 'thrown into the classroom' without a transition period" (D. Lee, 2011, p. 11). Positive comments by SCTs about support were found in just over half of the studies on various levels of support as summarised by Jessica who "felt supported ... through the collaboration and support of other teachers, support staff, and administrators" (Harmon, 2018, p. 55).

In almost half of the case studies, remarks were also found on acknowledgement or recognition of competencies related to prior careers. Mostly, these concerned negative comments—e.g. "Others [teachers] see me as green, they think they can't really can't [sic] learn anything from me,

they don't see my previous experience as relevant to being a teacher" (Trent et al., 2014, p. 104); or "administrators completely ignored the possibility of finding value in their previous professional careers" (Kahn, 2015, p. 96). This lack of recognition was responded to negatively by the SCTs. For example, Abi mentioned being "frustrated by the limited recognition of her competence and experiences" (Watters & Diezmann, 2015, p. 180), and Jim voiced his frustration, stating: "I am not credited for what I have done previously and that does bug me" (Varadharajan, 2014, p. 158). Positive comments were found in just over a quarter of the studies—e.g. "the tutor noticed [the SCT's] knowledge of management and realised that his skills would be valuable" (Newman, 2010, p. 468). Such recognition contributed positively to the SCTs. For example, Katie felt proud when her "capabilities were recognised early" (Watters & Diezmann, 2015, p. 181), while Patrick mentioned that "recognition and valuing of his previous experiences by others helped him to learn as a student teacher" (J. Williams, 2013, p. 103).

4. Discussion

Education is witnessing an influx of second-career teachers, which is important not only to address teacher shortages, but also because their previous professional expertise can be beneficial in their new work environment. However, research has not yet clarified why utilising PPE is reported sometimes as beneficial and other times as hindering. Seeking to gain a better understanding of beneficial or hindering utilisation of PPE, we analysed 41 case studies obtained through a systematic literature review using the lens of transfer of expertise. The aim of the analysis was to investigate the association between the conditions for transfer as identified in the literature (near/far transfer, routine/adaptive expertise, knowledge representation, support from environment) with beneficial or hindering utilisation as reported by SCTs. Below, results from this investigation are interpreted and discussed to answer the research questions. Furthermore, theoretical and practical implications will be discussed.

4.1. Interpretation of findings

This section answers the research questions (RQs) by interpreting the results, after which the interrelationship between the results will be discussed.

4.1.1. RQ1 Characteristics of PPE

The first research question was "How can near/far and routine/adaptive PPE characteristics be recognised in SCTs' descriptions?"

We found indications that SCTs characterised their previous domain as either far (e.g. finance) or near (e.g. family and social services) to the teaching domain. In addition, SCTs characterised tasks they performed in their previous career as either far (e.g. naval architect) or near (e.g. training customers) to the task of teaching. The literature states as a prime condition for transfer of expertise the level of similarity between the original and the new task (Barnett & Ceci, 2002; Detterman & Sternberg, 1993) in which similarity is recognised as an ill-defined concept (Barnett & Ceci, 2002). With most literature primarily considering domain aspects when discussing transfer in terms of near/far (e.g. Chi et al., 2014; Detterman & Sternberg, 1993), this study found that most SCTs report near transfer tasks even when coming from far transfer domains. This indicates that for SCTs in secondary education, near/far estimations should include task elements (as we did in this study), because these may indicate possibilities for transfer which will remain obscured when only considering domain aspects.

To shed light on the adaptive and routine expertise of PPE, we looked for indications of routine/adaptive expertise by checking whether participants reported successful adaptation to change or whether change was common to tasks within their previous work environment. While the literature generally refers to the expert as having either routine or adaptive expertise (Bohle Carbonell & van Merriënboer, 2019; Hatano &

Inagaki, 1984; Stigler & Miller, 2018), our study shows that SCTs may display adaptive expertise in some tasks or within some situations (e.g. responsibilities in which change was a common factor) while exhibiting routine expertise in other tasks or situations (e.g. holding authority which was never questioned).

While studying expressions of routine/adaptive expertise among SCTs, many comments by SCTs on the perceptions and opinions of colleagues in the school context were noted, often indicating resistance to change with colleagues or believing all teachers will eventually fall in line with their standardised view of teaching. These comments can be considered as indicative of routine expertise, showing a preference for maintaining routines and a resistance to change (Vermeulen, 2016) which may hinder SCTs' transfer of expertise, as they may find little openness with their colleagues to apply what can be learned from such PPE (Wilkins & Comber, 2015; Yelon, 1992).

4.1.2. RQ2 Transfer of PPE

The second RQ was "How is transfer of PPE described in terms of knowledge used and beneficial/hindering influence?"

This study indicates that SCTs describe certain procedural knowledge from their PPE as beneficial within the new teaching domain, although the literature relates procedural knowledge to the professional context, considering it to be domain-specific and hardly transferrable (Broudy, 2017; Ericsson et al., 1993). Such procedural knowledge described as beneficial related not only to general skills such as time management and planning skills, but also to more domain-specific skills—e.g. procedures from the military which were applied to organise the classroom—suggesting that SCTs coming from various domains may still benefit from certain procedural knowledge. Declarative knowledge was often visible, as this mostly coincides with the subject matter of teaching, although SCTs sometimes struggled with how to teach that knowledge reflecting their novice status as teacher. The use of abstract, tacit knowledge was referred to in nearly all studies as beneficial in dealing with the new situations. This aligns with literature suggesting that abstract knowledge supports the transfer of expertise, as such knowledge is engaged for unknown problems to form a deeper, more appropriate understanding before selecting the relevant procedural and/or declarative knowledge to process the problem further (Chi et al., 1981; Murphy & Wright, 1984).

In almost all the case studies included, SCTs described beneficial utilisation of PPE. This confirms that PPE may equip SCTs with skills such as interpersonal skills (Trent et al., 2014) or conflict resolution skills (Varadharajan, 2014) to become effective teachers (Chambers, 2002; Kahn, 2015). Also, PPE may equip SCTs with skills such as Information Technology (IT) skills (Varadharajan, 2014) or leadership skills (Kahn, 2015) to make a contribution to the wider school organisation as noted in the literature (Chambers, 2002; Powers, 2002). In about half of the case studies, participants experienced hindering influences from their PPE, confirming the literature stating that SCTs do not necessarily benefit from (all) their PPE (Poole, 2018). These hindering influences are often attributed to an incorrect estimation of similarity with a previous task (near transfer) or an insufficient awareness that, despite knowledge and experience, they still begin as novice teachers (Fry & Anderson, 2011).

4.1.3. RQ3 Support for Utilising PPE

The third RQ was "How do SCTs characterise the support received for transfer of their PPE?"

In almost all the studies analysed, SCTs commented negatively on the support they received, which is concerning, as the importance of support for starting SCTs has been widely recognised (Ruitenburt & Tigchelaar, 2021; Zuljan & Požarnik, 2014). This resulted, among other things, in hindering development (Gordon & Newby Parham, 2019) and feelings of isolation (Varadharajan, 2014), and was even mentioned as a reason to leave the teaching profession (Hunter-Johnson, 2015).

Moreover, the observed lack of acknowledgement of PPE caused

feelings of frustration in SCTs, confirming literature stating that lack of recognition disregards the SCT as a professional and hampers SCTs' integration into the new teaching environment (Coppe et al., 2023; Wilkins & Comber, 2015). Also, colleagues' routine expertise (i.e. resistance to change) (e.g. Watters & Diezmann, 2015), may negatively influence SCTs' transfer of expertise, as SCTs may not feel wholeheartedly encouraged to apply what can be learned from their PPE (Eraut, 2009; Yelon, 1992).

4.1.4. Interrelationship between results

As the aim of this study was to gain a better understanding of beneficial and hindering utilisation of PPE as reported by SCTs, this section discusses how the conditions for transfer (near-far transfer, knowledge representation, routine-adaptive expertise and support from the environment) were found to be associated with a beneficial or hindering influence of PPE.

Beneficial or hindering utilisation of PPE is determined by the direction and magnitude of the transfer (Kimball & Holyoak, 2000). In literature, direction and magnitude are related to the extent to which structural similarity (i.e. near transfer) between the prior task and the new task is correctly assessed (Gick & Holyoak, 1987; Kimball & Holyoak, 2000). This overlaps with findings from this study, as beneficially utilised PPE was generally described in terms of near transfer, while for hindering utilisation of PPE, the *perceived* near transfer, which was expected by the SCT to contribute beneficially, was eventually clarified in terms of being too different. This highlights the importance of correctly assessing the similarity of earlier tasks. In addition, for expert content knowledge, the SCT's novice status as a teacher may contribute to feelings of hindering utilisation, with the SCT not knowing how to teach that knowledge due to a lack of pedagogical content knowledge (Shulman, 1986).

Besides near transfer, the results from this study indicate that adaptive expertise on near transfer tasks is more frequently linked to beneficial utilisation, while routine expertise on such tasks may contribute to hindering utilisation. With adaptive expertise generally being understood as essential to cope with changing circumstances within a domain (Bohle Carbonell et al., 2016; Ward et al., 2018), and SCTs generally changing their work domain to become teachers, these results indicate that adaptive expertise developed earlier is essential for SCTs to cope with changes after transferring to the new domain. This may be a result of the required situational adaptation of PPE due to different circumstances in the new context (Eraut, 2009), which may be easier for SCTs who have developed adaptive expertise and hence utilise PPE beneficially (Bohle Carbonell et al., 2014). For each near transfer task, the type of expertise (routine or adaptive) should be reviewed, as experts may have routine expertise for some tasks and adaptive expertise for others as became apparent in this study.

Finally, there were almost no indications of SCTs being supported by a mentor or colleague to help them compare previously executed tasks with potentially similar tasks in the new job (Eraut, 2009), although supporting experts in correctly assessing such similarities is recognised as an important step to facilitate the transfer of expertise (Detterman & Sternberg, 1993; Gick & Holyoak, 1987). This lack of support might contribute to incorrect assessment of perceived similarity by the SCT and hence an increased hindering influence of utilised PPE.

4.2. Limitations

The case studies analysed in this study focused on the influence of previous professional expertise and were not designed to investigate conditions for transfer as indicated in the theoretical framework of this study. However, the case studies provided sufficiently rich descriptions and personal details of the SCTs that resulted in well populated categories that fit the theoretical perspective of transfer of expertise. Still, as a result, the conclusions herein are provisional and subject to future (case) studies with a design more focused on this purpose.

As the included case studies covered a wide geographical area (see

supplementary data, Appendix B; Table B1), cultural aspects may have influenced some of the reported results as, for example, hierarchy or support may be perceived differently in different continents. Future studies may limit their research geographically to minimise cultural influences, or specifically address possible cultural influences on results.

The search cut-off date was 2020 while it took until early 2023 to submit the manuscript due to parttime availability of the primary researcher. During this time, we followed the additional literature which became available, such as, Weinmann (2022) and Imanuel-Noy and Schatz-Oppenheimer (2023) on utilising PPE and Coppe (2023) and Kwok and Cain (2021) on acknowledgement and support. Although relevant, none of this literature contradicted our findings, and to not further delay submitting the manuscript, we opted to proceed with results of the original timespan.

Finally, all comments on support and acknowledgement for earlier accomplishments were from SCTs and hence only reflect *perceived* levels of support and acknowledgement. Still, we value these perceptions, as they reflect how SCTs appraise their induction into the new teaching job (Ferguson & Bargh, 2004).

4.3. Implications for scientific practice

Several possible implications for scientific practice emerge from this study. When estimating possibilities for SCTs' transfer of expertise, the near/far distinction should not be limited to the original work domain but should also include a review of tasks for which expertise has been developed, as certain tasks, even within far transfer domains, may be classified as near transfer. In addition, the concept of routine/adaptive expertise appears not to be a dichotomy for SCTs, as they may have developed routine expertise in some tasks and adaptive expertise in others. Whether professionals other than SCTs also show combined routine/adaptive expertise is as yet unclear. When adaptive expertise has been developed on near transfer tasks, the potential for beneficial transfer seems to increase, while hindering utilisation seems more frequently reported for routine expertise.

Considering these implications, and viewing the first limitation, we recommend that future research into SCTs' transfer of PPE specifically focuses on conditions for transfer as identified in this study in relation to the adaptation process of the SCT. This may clarify the, currently perceived, indirect relationship between near transfer tasks and routine or adaptive expertise in (some of) those tasks versus beneficial or hindering utilisation of this PPE. To go beyond perceived levels of support and acknowledgement, such research should preferably also include participants from the school organisation (e.g. SCTs' mentors or school principals) for data triangulation purposes.

4.4. Implications for educational practice

Analysing previous task elements for similarity with teacher tasks (i.e. near transfer) may clarify a potential (beneficial) influence of PPE for SCTs. For this analysis, SCTs, with their detailed knowledge about the previous work domain, may need assistance from their supervisor (e.g. teacher educator or mentor) to identify and discuss areas of task similarity, which may facilitate beneficial utilisation and minimise hindering influences of PPE. This analysis can be combined with an estimation of routine or adaptive expertise in these (near transfer) tasks. In addition to their supervisors, frameworks identifying key aspects of the teaching job, such as Snoek et al.'s (2018) teacher professional profile or Matsumoto-Royo and Ramírez-Montoya's (2021) overview of core practices, can also be useful. During certification, special attention to foster adaptive expertise may support beneficial utilisation especially where routine expertise is identified in areas of near transfer, as this can be hindering for the transfer of PPE. Also, the potential disparity between expert content knowledge (CK) and novice pedagogical content knowledge (PCK) (Depaepe et al., 2015) may require specific attention to make SCTs aware

of, and support them in, their PCK learning curve to reduce stress and anxiety during the transition period. Since the case studies have frequently reported hindering influences, the elements identified in this study that contribute to a potential hindering influence deserve careful attention by those supporting the SCT to ease the transition into teaching.

This study found that support for SCTs in general and for the transfer of expertise in particular is largely perceived as insufficient. Mentors are encouraged to recognise the need for suitable support structure for SCTs (Ruitenbreg & Tigchelaar, 2021) and to explore with the SCT where their PPE may contribute to teaching. Of particular concern is the (perceived) lack of acknowledgement of the acquired competencies SCTs bring from their previous careers: this study has shown the potential impact SCTs can have when utilising their PPE within and outside the classroom. School leaders are encouraged to recognise the SCT as a new, experienced professional in the team (albeit a novice teacher) and explore with the SCT where their PPE may contribute to the school organisation to recognise and benefit from these competencies. Also, the perceived routine expertise among colleagues as reported by SCTs may alert the school leadership to investigate the openness to change within their organisation to ensure SCTs are encouraged and feel supported to apply what is relevant from their earlier acquired expertise.

5. Conclusion

The aim of this study was to gain a better understanding of beneficial and hindering utilisation of PPE by SCTs by looking at various conditions for transfer as outlined in the RQs. The results of RQ1 and RQ2 indicate that, for responsibilities both within and outside the classroom, beneficial transfer of PPE is more likely for near transfer tasks (i.e. with perceived similarity to a known task) for which adaptive expertise has been developed. Hindering transfer of PPE seems to be influenced by incorrect estimation of perceived similarity or by routine expertise in the task to be transferred. RQ3 indicates that transfer of expertise is facilitated by supporting SCTs in noticing (and correctly estimating) the similarity between tasks, evaluating whether their PPE is routine or adaptive in nature, providing feedback on the situational adaptation needed, and a school environment that is characterised by adaptive expertise among colleagues.

Author contributions

Gerard den Hertog: conceptualisation, methodology, writing – original draft, editing
Monika Louws: conceptualisation, methodology, writing – review and editing, supervision,
Martine van Rijswijk: conceptualisation, methodology, writing – review and editing, supervision,
Jan van Tartwijk: conceptualisation, writing – review and editing, supervision.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

No data was used for the research described in the article.

Appendix B. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.tate.2023.104290>.

Appendix A

Overview of Main Results

Study	Author	# Participants	Far domain ^a	Far task ^a	Routine/adaptive SCT	Routine/adaptive environment	Beneficial/hindering	Knowledge utilisation	Support	Acknowledgement
1.	Poole (2018)	7			Routine		B/H	T	S+/S-	
2.	Rowston et al. (2020)	19			Adaptive	Routine	B	P/D/T	S-	
3.	Watters and Diezmann (2015)	14			Routine/adaptive	Routine/adaptive	B/H	D/T	S+/S-	A+/A-
4.	Tigchelaar (2012)	8	FD		Adaptive		B	D/T		
5.	Kowalczyk-Walędziak (2016)	9			Routine		B/H	P/D	S-	
6.	Watters & Diezmann, 2013	Dataset same as study 3								
7.	Trent et al. (2014)	8	FD	FT	Adaptive	Routine	B	D/T	S-	A-
8.	Douglas (2011)	12					B	D/T	S+/S-	
9.	Varadharajan (2014)	7	FD		Routine/adaptive	Routine	B	D/T	S+/S-	A-
10.	Harmon (2018)	4	FD		Adaptive	Routine	B	P/T	S+/S-	
11.	Haim and Amdur (2016)	30			Adaptive		B/H	P/D/T	S+/S-	
12.	Varadharajan and Schuck (2017)	Dataset same as study 9								
13.	Aslan (2016)	5	FD		Adaptive		B	P/D/T		
14.	Kember (2011)	9	FD		Routine/adaptive	Routine	B/H	P/T	S+/S-	A-
15.	Hanington (2018)	15	FD	FT	Adaptive		B	P/T	S-	
16.	Kahn (2015)	12	FD		Adaptive	Routine/adaptive	B	P/D/T	S+/S-	A+/A-
17.	Rubalcaba (2018)	6	FD		Routine/adaptive	Adaptive	B/H	P/T	S+/S-	A+/A-
18.	Hunter-Johnson (2015)	18	FD	FT	Adaptive		B	P/D/T	S-	
19.	Anderson et al. (2014)	3	FD	FT	Routine/adaptive	Routine	B/H	D	S+/S-	
20.	Fry and Anderson (2011)	4	FD		Routine/adaptive		B/H	D/T	S+/S-	
21.	Wilkins (2013)	14	FD	FT	Adaptive	Routine	H		S+/S-	A-
22.	Lee (2011)	12			Adaptive	Routine	B	P/D/T	S-	A-
23.	Lee (2010)	Dataset same as study 22								
24.	Nielsen (2014)	16			Adaptive	Routine	B	P/D/T		A-
25.	Tan (2012)	5	FD	FT	Adaptive		B/H	T		
26.	Wilkins and Comber (2015)	24	FD		Adaptive	Routine	B	D/T	S-	A-
27.	Wagner and Imanuel-Noy (2014)	15	FD	FT	Adaptive	Routine	B/H	P/D/T	S-	
28.	Welfare (2013)	10	FD		Adaptive	Routine	B	D/T	S+/S-	A-
29.	Bar-Tal et al. (2019)	10	FD	FT	Adaptive	Routine	B	P/T	S-	
30.	Muller et al. (2014)	30	FD	FT	Adaptive		B	P/D/T		
31.	Price (2019)	12	FD		Adaptive	Routine/adaptive	B	T		A+
32.	Johnson (2018)	18	FD	FT	Routine/adaptive	Routine	B/H	P/D/T	S+/S-	A-
33.	Snyder (2011)	3	FD		Adaptive		H	D/T	S+	
34.	Gordon & Newby Parham, 2019	2	FD	FT	Routine/adaptive	Routine	B/H	T	S+/S-	
35.	Martin (2018)	1	FD		Routine/adaptive	Adaptive	B/H	P/D/T	S+	
36.	Grant (2016)	20	FD		Adaptive	Routine	B	P/D/T	S+/S-	A-
37.	Mitchell (2019)	8			Adaptive		B	P/D/T	S+	
38.	Peter et al. (2011)	12			Adaptive	Routine	B/H	D/T		A-
39.	Williams (2013)	3			Routine/adaptive	Routine/adaptive	B/H	D/T	S+/S-	A+/A-
40.	Diezmann and Watters (2015)	1			Routine	Routine	B/H	P/D	S-	A-
41.	Newman (2010)	3	FD		Routine/adaptive	Routine	B/H	P/D/T	S+/S-	A+/A-

Note. FD = Far transfer on domain; FT = Far transfer on task; B = Beneficial; H = Hindering; P = Procedural; D = Declarative; T = Tacit; S+ = Positive on support; S- = Negative on support; A+ = Positive on acknowledgement; A- = Negative on acknowledgement.

^a Not including 'near transfer' elements.

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