Caves, Katherine; Baumann, Severin

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Caves, Katherine; Baumann, Severin

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Katherine Caves and Severin Baumann

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KOF

ETH Zurich
KOF Swiss Economic Institute
LEE G 116
Leonhardstrasse 21
8092 Zurich, Switzerland

Phone +41 44 632 42 39
Fax +41 44 632 12 18
www.kof.ethz.ch
kof@kof.ethz.ch

Getting there from here: A literature review of VET reform implementation

Katherine Caves* and Severin Baumann

ETH Zurich, KOF Swiss Economic Institute, Leonhardstrasse 21, 8092 Zurich, Switzerland

Abstract

Despite huge incidence of vocational education and training (VET) reforms, we know more about good VET systems than how to implement them. In this review, we develop a determinant framework for VET implementation that combines theories and frameworks related to policy and general education reform, plus VET theory and the few existing VET implementation frameworks. We review 1,835 sources on VET reform implementation and code 177 for 1,538 framework-item mentions. Key success factors are employer, intermediary, and educator involvement; human, financial, and research resources; cooperation and coordination; clear strategy with political will and context fit; and accountability. There is a bias towards Europe, though it does not drive results. The sample equally represents developed and developing countries. Future research should test our framework, examine item interactions, and develop theory. VET reform implementation is distinct from general education reform implementation, and its evidence base is bigger than expected but less systematic than it should be.

Keywords: VET, implementation, VET reform, reform implementation

* *Tel.* +41 44 632 68 12; *Email address:* caves@kof.ethz.ch

Introduction

Vocational education and training (VET) reforms are a major global topic, driven by changing skills requirements (Figueiredo, Biscaia, Rocha, & Teixeira, 2017), youth employment challenges (Pusterla, 2016), and development goals (Frigotto, Ciavatta, & Ramos, 2009). Thanks to decades of research on what makes VET systems work and how they can be most effective (e.g., Bolli, Caves, Renold, & Buergi, 2018; Ryan, 2000; Wolter & Ryan, 2011), researchers can contribute a great deal to structuring the goals and content of reforms. However, there is much less to share on how would-be reformers can move from a worse system to a better one in VET (Holmes, 2009). This literature review synthesizes the available evidence on reform implementation in VET to resolve that problem and provide some actionable guidance for both reformers and researchers in the field.

Implementation is the level to which a measure or policy is taken up in practice (Domitrovich & Greenberg, 2000). According to Li and Pilz (2017), "implementation research focuses on the discrepancy between the way a measure has been planned and how it is implemented in practice, and is designed to gather information about the extent of uptake in practice and the factors involved" (p. 472). There are strong literatures on implementation of policies in general (e.g. Nilsen, 2015; O'Toole, 1986; Winter, 2012) and implementation of reforms in general education (i.e. Fullan, 2015; Honig, 2006; Kohoutek, 2013; Viennet and Pont, 2017). However, with very few exceptions (Fluitman, 1999; Sultana, 2008) there is little for VET implementers to work with—partly because the issue is so complex (Atchoarena & Grootings, 2009). We endeavor to reduce some of that complexity.

In this review, we draw on the policy implementation, education reform implementation, VET reform implementation, and VET literatures to develop a determinant framework of key items that should influence VET reform. We take this approach because, while VET implementation overlaps significantly with policy and general education implementation, there are unique features of VET that make its institutional and other requirements unique (i.e. Ryan, 2000). We search a broadly for sources that cover VET reform implementation, assessing 1,835 sources and fully coding 177. This is our best effort to code every relevant paper in the field and therefore bring together the greatest possible breadth of existing knowledge.

We have two types of results: key items and trends in the literature. The most important success factors for VET reform implementation are employers' engagement, adequate personnel for reform, a clear strategy for implementation, sufficient financial resources, availability of research results and data, the participation of intermediaries like employers' associations, political will for reform, coordination among actors, educators' engagement in the reform, cooperation among actors, fit between the planned reform and the institutional context, and accountability or quality assurance of reform processes. Other items

need further research, especially the role of foreign assistance or influence, appropriate centralization or de-centralization, appropriate bottom-up or top-down approaches, formalism or legal framework development, the role of low-level actors, piloting, pacing, and the best scope for reforms.

When we look at trends in the literature, we find that sources are generally similar regardless of whether they are peer-reviewed or not, older or newer, in developed or developing countries, or on any continent. We do identify a major gap in the literature in non-European continents, and find that non-peer-reviewed sources are a large part of the available research in this field.

In general, what matters for VET reform implementation is not the same as what matters for general education reform implementation, though there is overlap. VET reforms need to pay close attention to the actors and institutions involved, especially employers and intermediaries. There is a great need for more research on this topic, especially so we can identify the interactions among items, their relative importance, and any conditionality within or between items—all of those are beyond the scope of this review.

Theory and literature

We draw on two main types of literature in developing a determinant framework (Nilsen, 2015) for this review: implementation frameworks for policy and education reform, and theory on VET. Our goal is to develop a reasonable framework for what should matter in VET reform implementation that can include everything sources mention. After O'Toole's (2004) complaint that "the research literature is still overpopulated by a mass of potential explanatory variables," we also aim for a brief list of relatively broad items for interpretability. We begin with frameworks and key items in implementation research, then add items from general education reform implementation, and finally combine what information exists on implementing VET with theory on why VET works to finish our framework.

Implementation research

The field of general reform implementation research took shape in the early 1970s, kicking off with Pressman and Wildavsky (1973). Its evolution since is often described in three generations (for more detail see Honig, 2006; Kohoutek, 2013; Winter, 2012). The first generation was mostly exploratory single case studies examining policy implementation and exploring "gaps" like design-implementation mismatch (Nilsen, Ståhl, Roback, & Cairney, 2013). These studies tended to view the policy process as linear, top-down, and evolving in discrete stages (Nilsen et al., 2013). In general, research from this period was more concerned with describing the implementation process than predicting policy outcomes (Schofield, 2001).

In the 1980s, the focus shifted towards building predictive models and understanding what factors influenced the implementation process (Schofield, 2001). It was only in this second generation of policy implementation research that serious attempts at theory building were undertaken (Kohoutek, 2013). Some implementation scholars emphasized central planners as key policy actors in the traditional view of policy-making as a hierarchical, purely administrative process, while others stressed the importance of local context and the implementers themselves (Nilsen et al., 2013). This gave rise to the familiar top-down/bottom-up dichotomy, as well as efforts to integrate the two approaches (Winter, 1990; Goggin et al. 1990; Matland, 1995). Over time, the synthesized approaches have become the accepted heuristic tool (Nilsen et al., 2013; Saetren, 2014; Viennet and Pont, 2017).

Goggin et al. (1990) strongly influence the third generation of implementation research. These authors proposed a research paradigm emphasizing rigorous and longitudinal research designs, quantitative methods, and theory-driven hypothesis testing. Research from this era also takes a comparative and multi-theoretical approach (Schofield, 2001). However, this paradigm has not established itself, probably due to its strong and perhaps unrealistic methodological requirements (O'Toole, 2000; Winter, 2012). However, its focus on partial theory testing instead of a comprehensive implementation theory remains (Saetren, 2014), partly because the field is still populated by a multitude of theoretical frameworks and models, none of which has become the gold standard (Nilsen, 2015).

Najam (1995) synthesizes the existing literature into the 5C framework, which describes implementation processes in terms of five categories of key variables for successful implementation. These are Content, Context, Commitment, Capacity, and Clients and Coalitions. The categories are quite broad, but that makes the framework applicable across multiple types of implementation. We used the 5C model as the starting point for developing our own analytical framework for implementing VET reform. Najam (1995) defines the five categories as follows:

- "The *Content* of the policy itself—What it sets out to do (i.e. goals); how it problematizes the issue (i.e. causal theory); how it aims to solve the perceived problem (i.e. methods).
- "The nature of the institutional *Context*—The corridor (often structured as standard operating procedures) through which policy must travel, and by whose boundaries it is limited, in the process of implementation.
- "The *Commitment* of those entrusted with carrying out the implementation at various levels to the goals, causal theory, and methods of the policy.
- "The administrative *Capacity* of implementers to carry out the changes desired of them.
- "The support of *Clients and Coalitions* whose interests are enhanced or threatened by the policy, and the strategies they employ in strengthening or deflecting its implementation."

Implementation in general education

The relatively large implementation literature in general education is the first source of potential items for this review's framework. Education policy implementation has always been a large part of implementation research. An early pivotal work in this field is Cerych and Sabatier's (1986) book. That source identifies five factors critical for implementation, including a sound theory of action, unambiguous policy directives with adequate resources and coordination, management and political skills, support from key stakeholders at all levels, and a context where the policy is not undermined by changing conditions. Kendal (2006) adds leadership to that list.

The current state of implementation research in education is similar to that of implementation research in general. Policy-making and implementation are non-linear, dynamic, and integrated processes rather than products of centrally planned design (Gornitzka, Kyvik, & Stensaker, 2005). Scholars have shifted from trying to reduce complexity to confronting and embracing it (Honig, 2006), giving rise to new approaches like Complexity Theory, Organizational Theory, and Network Theory (Gornitzka et al., 2005; Honig, 2009). Another trend is single-case studies, often of innovative approaches that break with traditional views of policy reform and implementation (e.g. Emad and Roth, 2009; Souto-Otero, 2011).

Recent researchers still enumerate variables that affect implementation, usually frameworks of factors grouped into categories. One prominent framework in the educational change literature argues that educational reform depends on three key factor categories: policy, people and places (cf. Honig, 2006). These three dimensions are both independently important and interrelated, and entail three to five items

each. Pont and Viennet (2017) review the literature on implementing education policies and come to four dimensions: “smart policy design, inclusive stakeholder engagement, conducive context and a coherent implementation strategy” (p. 3). These dimensions include a number of items, drawn from other frameworks and empirical evidence.

Fullan (2015) and his coauthors are a major presence in the educational change implementation literature, including a list of ten elements for success. Fullan’s work brings in a focus on school-level change, capacity, teacher ownership, and school leadership. Barber, Moffit, and Kihn’s (2010) model emphasizes iteration, learning, and evaluation. The OECD (2011) focuses on institutions, resources, and a formal legal framework for the reform. Viennet and Pont (2017) provide an excellent summary table of education implementation frameworks.

Implementation in VET

In addition to the conditions that we draw from general education implementation, we need the conditions that might be specific to VET reform. Scientific interest in VET has grown in recent years, and Fluitman (1999) was one of the first to focus on VET reforms. He concludes that the obstacles to VET reforms are universal and well known from policy implementation research: lack of resources (monetary, informational, and human), lack of expertise and commitment, and administrative or regulatory constraints. Sultana (2008) develops a framework specifically for VET implementation, starting with the policy/people/places-framework (Honig, 2006) and adding a pace dimension. Because that framework deals specifically with VET, Sultana’s (2008) actors include employers and their associations, as well as trade unions. One OECD study addresses system-wide innovation in VET (OECD, 2009). That study develops a model and a typological framework with innovation drivers, enablers, and barriers. However, the study is not very generalizable and its findings have not had much impact.

The many comparative case studies VET reform implementation are almost entirely descriptive rather than theory building or systematic, drawing general lessons from country studies. For example, Wilson (1993) looked at VET reforms in eight countries for trends. One of the paper’s conclusion is that in developing countries VET reforms have to take place “in concert with industrialization, or industrial restructuring” in order to be successful (Wilson 1993, p.280). Interestingly, even this relatively informal conclusion is VET-specific, rather than derived from the general education implementation literature as suggested by Fluitman (1999).

Finally, we can add some of the theory and evidence on VET systems to our framework for VET reform implementation. Research on VET systems comes mainly from sociology and economics. The sociological contribution is primarily based on systems theory, asserting that the education and employment systems have different codes and programs, so VET needs to link the two systems in a way that balances the different advantages each side has to offer (see Rageth & Renold, 2017 for an overview). Higher-linkage VET programs tend to be better for student outcomes (Bolli, Caves, Renold, & Buergi, 2018), workplaces are key learning environments (Bolli & Renold, 2017), and dual VET systems tend to outperform school-based VET systems (Bolli, Egg, & Rageth, 2017).

Economics research on VET demonstrates why employers, intermediaries, and social partnership in general is so important for VET. Companies offer workplace training in dual VET programs, accepting the costs of training in exchange for the benefits of apprentice productivity and reduced hiring costs. Apprentices accept low training wages to pay for their training, and certification. Governments and other education-system actors coordinate among individual actors, ensure sufficient transferrable content, and certify training so graduates have mobility. Intermediaries like employer associations and chambers of

commerce help disperse some costs of training so companies and individuals can afford to participate (Wolter & Ryan, 2011; Ryan, 2000).

We combine the items and information from the existing frameworks summarized above into a determinant framework based on the 5C categories. We modify that scheme so that the *Clients and Coalitions* category becomes two categories: *Clients (Type)* and *Clients (Level)*. We present the full framework in the Method section.

Method

We used a systematic literature review approach for this study. What sets a systematic literature review apart from a "traditional" or "narrative" review is its use of a standardized, structured and protocol-driven methodology (Jesson, Matheson, & Lacey, 2011, p. 103). The aim of such a review is to be as transparent and unbiased as possible, by answering a clearly defined research question and following a clearly designed review process. We also analyze the results using some regression techniques, but do not formally carry out a meta-analysis because the results of our sources do not include effects sizes or regression results we can pool for such a purpose.

Search strategy

Given that much VET research is not academic but conducted by intergovernmental and bilateral organizations (Holmes and Maclean, 2008, p. 81), we did not restrict our search to peer-reviewed journals. However, to ensure a certain quality in the grey literature, we only included reports and studies that were accessible in (a) one of the electronic databases on VET and general education literature, (b) other more general academic databases, or (c) on websites of major organizations with research relevant to VET (see Table A1 for full list). In addition to systematically searching databases, we snowballed additional sources from key papers' references and recommendations from experts during the coding process.

The search syntax was based on the terms "vocational education" (including both VET and TVET), plus "implementation," "reform," "change," or "innovation." We made small modifications to the exact search phrasing, combination of terms, and specific use of search fields to fit the particularities each database (see Table A1 for full search terms by index). Finding the right search term for each index—one that balanced the trade-off between volume and relevance—was an iterative process. We conducted all final searches in January of 2018 and found 1,835 sources.

To decide whether to include a paper, we read its title, abstract, and—in case of doubt—conclusion. Selected sources had to be concerned with change in initial (upper-secondary) VET and had to explicitly deal with implementation. We are aware that researchers have different opinions on what the term implementation actually means (cf. O'Toole 1986), but for this study simply using the term qualified a paper for selection. Finally, only English-language papers were included. After screening the initial 1,835 results, we chose 135. Snowballing added another 44 sources for 177 fully coded sources.

Coding strategy

We developed a coding scheme of 30 items based on existing theory and frameworks, plus an iterative code-refining process. After independently combing through existing frameworks, we identified and

grouped common items into the modified 5C framework. After settling on our first list of items, both coders independently coded 20 randomly selected papers, then we refined codes and definitions through discussion. We repeated this process four times until we had a coding scheme that we used to code all sources. The final scheme captured everything sources noted as a success factor or barrier to implementation. We fully describe each item in the Results section.

The final coding scheme, summarized in Table 1, expresses items in terms of success factors—according to the most common findings—with the item's absence or opposite shown in parenthesis. The four possible codes were positive, negative, mixed, and non-mentioned. When we code something positive, it helps implementation. If negative, it hurts implementation. When something is either conditional, neutral, or otherwise complicated, we code it as mixed. For example, the item short-named *Coordination* is coordination, efficiency, and good management, as opposed to bureaucracy or bad management. We code that *Coordination* is positive when a paper states that coordinating helped implementation, when it states that bureaucracy hindered implementation, or when a lack of coordination hindered implementation. We code *Coordination* as negative if bureaucracy helped implementation, the lack of bureaucracy hurt, or the lack of cooperation helped.

Both authors independently coded every source for all 30 items. We resolved disagreements every 25 sources through intensive discussion, including going back to the source to re-read specific mentions. This approach is time-consuming, but minimized subjectivity and maximized rigor. Average interclass correlation coefficient (ICC), a measure used to assess interrater reliability, was 0.81 before resolution. After resolution, we agreed 100%. We also noted sources' publication year, literature type (peer-reviewed or non-reviewed literature), and the country/countries described by the source. In the process, we dropped 40 sources because they were not sufficiently relevant, bringing our final sample of coded papers to 177.

Table 1: Determinant framework

Cat.	Short name	Item description (vs. opposite)	Selected source frameworks
Content	Strategy	Clarity/strategy/vision (vs. confusion/short-termism/un-clarity)	Cerych and Sabatier, 1986; Honig, 2006; Pont & Viennet, 2017; Sultana, 2008
	Accountability	Quality assurance/regulation/accountability (vs. lack thereof)	Pont & Viennet, 2017; Fullan, 2015
	Piloting	Piloting/iteration (vs. lack thereof)	Barber, Moffit, & Kihn, 2010
	Slow Pace	Slow pace (vs. fast pace)	Pont & Viennet, 2017; Sultana, 2008
	Bottom-Up	Bottom-up (vs. top-down)	Cerych and Sabatier, 1986; Gornitzka et al., 2005
	Incremental	Incremental scope of change (vs. radical scope)	Barber, Moffit, & Kihn, 2010; Sultana, 2008
Context	Coordination	Coordination/efficiency/management (vs. bureaucracy)	Cerych and Sabatier, 1986; Sultana, 2008; Fluitmann, 1999
	Context Fit	Context/institutional fit (vs. mismatch/bad fit)	Pont & Viennet, 2017; Sultana, 2008; Wilson, 1993
	Decentralize	Decentralization (vs. centralization)	Pont & Viennet, 2017
	Formalism	Formalism/legislation (vs. informality, no laws)	OECD, 2011; Ryan, 2000
	Strong Econ	Strong economy/low unemployment (vs. weaker)	Pont & Viennet, 2017; Wilson, 1993
	Ed Quality	Good existing education quality (vs. poorer)	Pont & Viennet, 2017
Commitment	Political Will	Political will/ demand-side (vs. disinterest/opposition)	Cerych and Sabatier, 1986; Honig 2006; Pont & Viennet, 2017; Fullan, 2015
	Cooperation	Cooperation/consensus (vs. conflict)	Pont & Viennet, 2017; Sultana, 2008; Wolter & Ryan, 2011; Bolli et al., 2018; Rageth & Renold, 2017
	Foreign	Foreign assistance/influence (vs lack thereof)	Pont & Viennet, 2017
	Ownership	Ownership (vs. lack thereof)	Fullan, 2015
	Low Turnover	Long political cycles/low turnover (vs. shorter/higher)	Fullan, 2015
Capacity	Personnel	Personnel/expertise (vs. lack thereof)	Cerych and Sabatier, 1986; Honig, 2006; Pont & Viennet, 2017; Fullan, 2015; Barber, Moffit, & Kihn, 2010; Sultana, 2008; Fluitmann, 1999
	Finances	Financial/material resources (vs. lack thereof)	Cerych and Sabatier, 1986; Honig, 2006; Pont & Viennet, 2017; Fullan, 2015; Sultana, 2008; Fluitmann, 1999
	Research	Data/research/evaluation (vs. lack thereof)	Cerych and Sabatier, 1986; Pont & Viennet, 2017; Fluitmann, 1999
	Time	Time (vs. lack thereof)	Pont & Viennet, 2017; Fullan, 2015; Sultana, 2008
	Leadership	Strong/good leadership (vs. lack thereof)	Kendal, 2006; Pont & Viennet, 2017; Fullan, 2015
Clients (Type)	Employers	Employer engagement (vs. lack thereof)	Sultana, 2008; Wilson, 1993; Wolter & Ryan, 2011; Bolli et al., 2018; Rageth & Renold, 2017
	Educators	Educator engagement (vs. lack thereof)	Cerych and Sabatier, 1986; Honig, 2006; Pont & Viennet, 2017; Sultana, 2008
	Intermediaries	Intermediary engagement (vs. lack thereof)	Honig, 2006; Pont & Viennet, 2017; Sultana, 2008; Wolter & Ryan, 2011; Bolli et al., 2018; Rageth & Renold, 2017
	Trade Unions	Trade union engagement (vs. lack thereof)	Pont & Viennet, 2017; Sultana, 2008; Wolter & Ryan, 2011; Bolli et al., 2018; Rageth & Renold, 2017
	Community	Community/parent/student engagement (vs. lack thereof)	Cerych and Sabatier, 1986; Honig, 2006; Pont & Viennet, 2017; Sultana, 2008; Fullan, 2015
Clients	Low Level	Low/local-level engagement (vs. lack thereof)	Cerych and Sabatier, 1986; Honig, 2006; Pont & Viennet, 2017
	High Level	High/national-level engagement (vs. lack thereof)	Cerych and Sabatier, 1986; Honig, 2006; Pont & Viennet, 2017
	Mid Level	Mid/regional/level engagement (vs. lack thereof)	Cerych and Sabatier, 1986; Honig, 2006; Pont & Viennet, 2017

Results

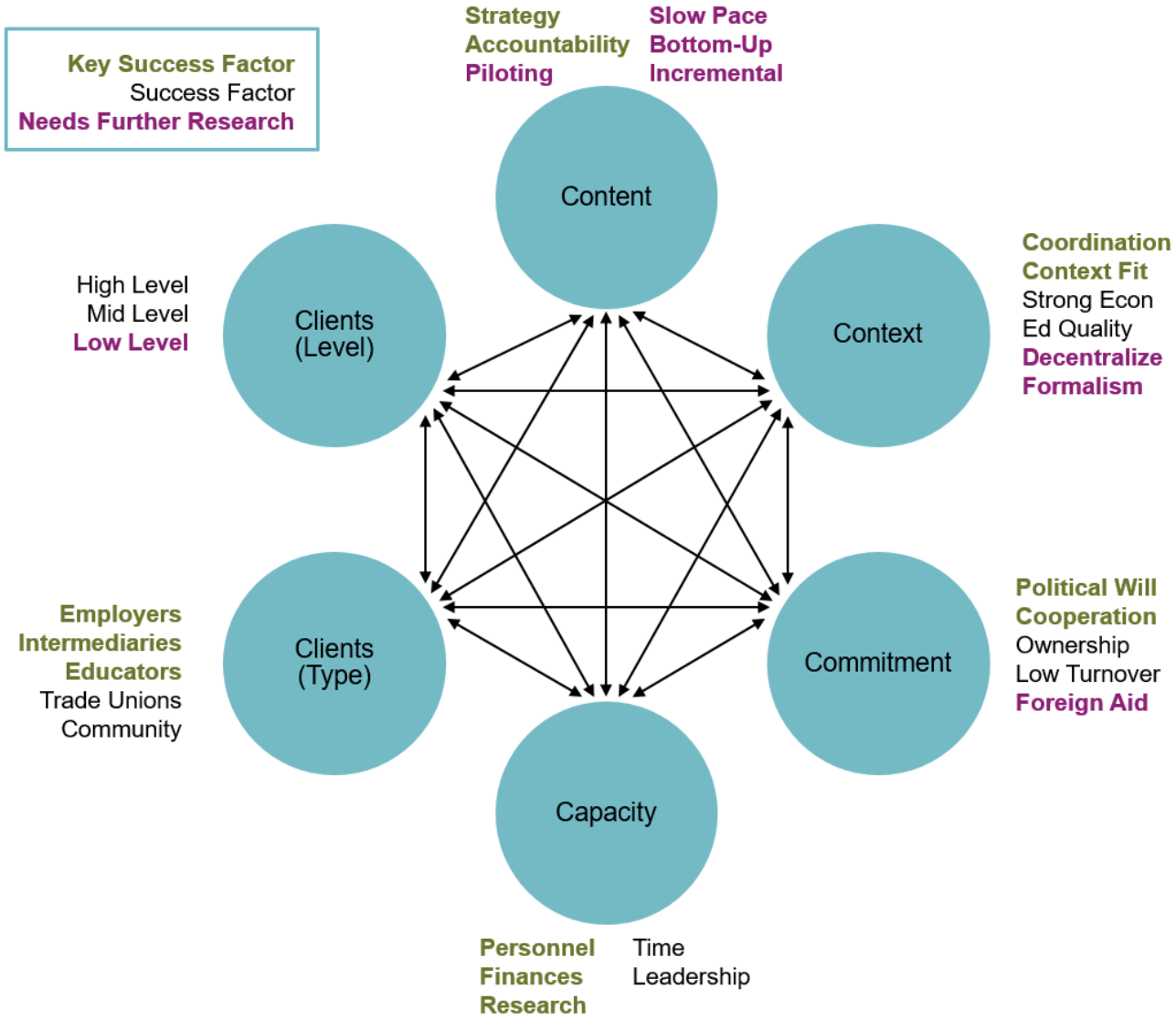
In our final sample of 179 sources, we found 1,538 mentions of the 30 items in our final coding scheme. We expect almost entirely positive codes because our framework is designed so positive mentions reflect existing theory. Indeed, there are 1,414 positive codes compared to 43 negatives and 81 mixed. Table 2 summarizes the positive, negative, mixed, and total times the literature mentioned each item by category, as well as percent conflict.

Table 2: Synthesis of item mentions in the literature by category

Category	Item	Positive	Mixed	Negative	Total
Content	Strategy	88	2	0	90
	Accountability	54	3	3	60
	Piloting	38	4	1	43
	Slow Pace	33	4	3	40
	Bottom-Up	18	10	2	30
	Incremental	13	3	6	22
Context	Coordination	73	1	0	74
	Context Fit	64	1	0	65
	Decentralize	14	11	9	34
	Formalism	39	7	3	49
	Strong Econ	13	1	1	15
	Ed Quality	5	0	0	5
Commitment	Political Will	73	3	0	76
	Cooperation	68	0	0	68
	Foreign Aid	35	13	8	56
	Ownership	32	1	0	33
	Low Turnover	14	0	0	14
Capacity	Personnel	95	0	0	95
	Finances	85	2	1	88
	Research	84	1	1	86
	Time	36	1	0	37
	Leadership	29	0	0	29
Clients (Type)	Employers	104	1	0	105
	Educators	68	4	1	73
	Intermediaries	81	1	2	84
	Trade Unions	38	0	0	38
	Community	17	0	0	17
Clients (Level)	Low Level	43	4	0	47
	High Level	35	1	2	38
	Mid Level	25	2	0	27
Totals		1414	81	43	1538

We take two main analytical approaches: we explore how each item came up in the literature and discuss that item's relationship to successful implementation, and we look at broader trends in subsamples of the literature. For individual items, there are three categories: key success factors that come up frequently and positively, success factors that come up less often but still positively, and open questions that have many mixed and negative codes. Figure 1 summarizes the three types and shows our determinant framework visually.

Figure 1: Results by category and item



Key success factors

Key success factors are items that come up very frequently and are almost always positive. These items are most likely to be helpful regardless of other factors, and they are probably a good starting point for reformers.

Employers is the most-often-mentioned item, coming up 105 times with 104 of those mentions positive. It represents the employer engagement well known to be a critical part of successful VET systems, and appears to apply in their implementation as well. ETF 2017a states, “Stakeholders from the world of work must have a role, as a prerequisite for systemic change” (p19). Atchoarena and Delluc (2002) agree, saying about VET systems that "experience has shown that such a system can hardly be effective if most employers oppose it” (p13). This item might be the most obvious differentiator of VET reform implementation from the same process in general education.

Personnel was always positive, and was the second-most-mentioned item. This is a relatively broad item because it included any reference to needing human resources or -capital to implement reform. Frequently it referred to teachers because of the unique skills demands VET places on them. Grootings and Nielsen (2005) state, “Teacher competences and teacher education are the key factors in all processes of VET reform anywhere” (p25). However, there is some debate about what increasing capacity for teachers should look like. Mitchell, Hedberg, Paine, and Clayton (2003) state that “Innovation can occur without VET teachers being trained as innovators” (p101), and Czesand (1999) notes that lack of teacher practical experience is a problem, but in-service training is not the solution.

Outside of teacher capacity, *Personnel* also included many references to capacity and expertise in administrative and governance bodies, which will likely have to work in new domains or with new partners for VET. Grootings (1993) points out reforms need human as well as material resources. ETF (2017a) emphasizes the need for “professionals dealing with the implementation” (p85).

Strategy is another key item, and was mainly positive (88 positive, 2 mixed). This item covers the need for a sense of clarity, a plan, or a strategic vision to avoid confusion among the variety of actors involved in the implementation process. We coded it positive when sources stated that a strategy helped or that the lack of a strategy hurt implementation. Akanbi (2017) finds plans insufficient for reform and cites examples of reforms where perfectly good plans were foiled by corruption. In general, however, a strong strategic plan, clarity, and a sense of vision are prerequisites for successful implementation (e.g. McGrath et al., 2006; Williams, 1999; Grootings, 1993; Kalous & Grootings, 1997).

Finances includes both financial and material resources for the reform. These are nearly always positive (85 positive, 1 negative, 2 mixed), though some sources make the counterintuitive claim that resources might be decisive for failure and not success. For example, Atchoarena and Delluc (2002) point out that "subsidies or incentives offered to employers, through levy-based mechanisms, have not produced the desired effect" (p13) and Akanbi (2017) points out cases when money for implementation may have encouraged corruption rather than reform. Still, the overall trend is that funding helps, often including resources that come from external sources (Wallenborn, 2010)). Brandsma, ten Brummelhuis, and Plomp (1989) make a clear case for the role of resources in implementation, pointing out that a good plan cannot be implemented without instructional equipment and resources.

Research is any kind of data, evidence, or literature that can be used to support the reform’s implementation. Sometimes this item seems like it is playing into the planning phase of the reform rather than implementation, but it frequently came up as helpful in the implementation context (e.g. Welbers, 2011; Belbase & Young 1984; Castel-Branco, 2008). Nieuwenhuis and Shapiro (2004) point out that different evidence types will be useful in different reform contexts; Sohn, Kang, and Lim (2017) that evidence is only useful if implementers know how to apply it; and Ertl (2000) cautions against burying implementers in too so much evidence it reduces clarity.

Intermediaries are organizations or associations that fulfill a facilitating role between actors. In VET, these usually help the private and public sectors interact and are often chambers of commerce, employers’ associations, and other interest organizations. We code trade unions separately, but in sources that mention intermediary actors without specifying what they are, we did not make assumptions. This means there might be some overlap between this item and the more specific *Trade Unions* item.

We code intermediaries positively 81 times, mixed once, and negative twice. According to OECD (2009), intermediaries can serve as networks to “share, spread and diffuse innovations” and “link the micro level (e.g. school and further education) with the macro level (e.g. the Department for education and Labour)”

(p.49). When employers are not in sector-level organizations, they did not have the capacity to help with implementation because the intermediary can reduce their administrative load and increase efficiency (OECD, 2009).

Political Will is, broadly speaking, demand for change on the positive side, and resistance on the negative. This comprises support or resistance at any level of governance and from any relevant actor. It is positive in 73 instances, and mixed in 3. Fluitman (1999) points out how damaging opposition can be for implementation, stating, “perhaps the most serious constraint is people who resist change" (p64). Others note that VET-specific stigma, suspicions, and cultural divides can kill good reforms (Ryan, 2009; Burchert, Hoeve, & Kämäräinen, 2014). Will may not be enough for successful implementation by itself without a good plan (Akyeampong, 2002) or enough time (Burchert, Hoeve, & Kämäräinen, 2014). Grossmann and Naanda (2006) state the case for will most compellingly, saying “it is political will rather than institutional capacity that is a key ingredient for successful reform" (p16). According to Gill, Dar, and Fluitman (1999), "strong political will to reform is the common ingredient of successful efforts to restructure VET systems" (p429). When sources state that this item is mixed, the reason is that they claim it is insufficient for implementation success on its own, though still important.

Coordination includes efficiency and good management, but most often comes up as the opposite of bureaucracy. It is positive in 73 mentions and mixed in one. Cedefop (2017) argues that the main implementation challenge is “getting organized” (p25). While coordination is often cited as helpful, especially with the many actors involved in VET, more sources argue that bureaucracy is hurtful (e.g. Castel-Branco, 2008; Cedefop, 1997; Anaele, Adelakun, Dem Isaiah, & Barfa, 2014). The one mixed mention, Parkes (1991), argues that "a high degree of bureaucracy makes structural reform possible while non-bureaucratic reforms are needed for curriculum innovation and the teacher-learning process itself" (p48).

Educators *refers to teachers and trainers in VET and TVET schools.* They are the final implementers of educational change and have a lot of power over its outcome. Educators comes up 73 times, with 68 of the mentions being positive, 4 mixed and 1 negative. Educators and education-system actors have a key role in implementation and innovation, especially when it comes to sense making during a change process (Rekkor, Ümarik, & Loogma, 2013). However, different individuals might react differently to the same change (Duch & Andreasen, 2015)

Teachers specifically come up as actors in many sources. Teachers might resist a reform or innovation if they are not convinced of its practical utility (Runhaar & Sanders 2013), if they insist on teacher autonomy (Rekkor, Ümarik & Loogma 2013), or if they simply lack capacity. It is imperative that educators have time and incentives to innovate, because “innovation (…) demands more effort and time than routine teaching, and without incentives there is a low chance of success” (ETF, 2014c, p. 53).

Cooperation is mentioned 68 times, always positively. Given the many stakeholders involved in vocational education and training, consensus and cooperation among them is critical for achieving lasting change. According to Paik (2014), well-designed cooperation mechanisms “where all stakeholders can exchange information, discuss problems and challenges, and develop most efficient and effective solutions which benefit both consumers and providers” are a key factor for the implementation of pre-employment VET policies (p. 31). ETF (2017a) urges us to consider how interdependent actors are, with no actor able to implement alone. Trampusch (2010) notes that different relationships and constellations of cooperation among actors will lead to different types of change. Manuel Galvin Arribas (2016) challenges the concept of cooperation as a pure input, framing engagement and interaction among actors as an outcome of implementation, not part of the process.

Context Fit is a broad item that is closely related to the concepts of policy learning and policy borrowing. We coded it 64 times as positive and once as mixed. Hummelsheim and Baur (2014) argue that transferring the dual system of initial VET from Germany to Asian countries can only be successful if it "reflect[s] the existing conditions in the country" and is "adapted to its unique social, cultural and economic objectives" (p. 279). According to Hoppe et al. (2011), the "success of a [VET] strategy stands or falls with how well the strategy fits with other education sector policies and strategies" (p.283). Essentially, "new policies need to be strategically linked to goals and outcomes for national education systems and must be firmly related to concrete national policy priorities as well as anchored up in specific country institutional contexts" (ETF 2012a, p. 9). Policy learning is different from policy copying or borrowing in that it aims to develop a deep and situated understanding of policy problems in a country's' specific institutional context (ibid.).

The one study where we coded C*ontext Fit* as mixed states that, rather than adapting the VET reform to the institutional context, the institutional context itself may need to change for the reform to succeed. The argument is that, in developing countries especially, the goal of building a strong VET system has to go along with other institutional and even cultural changes like creating business-representing intermediaries and creating a culture of recognition for VET certifications (Abrahart & Tzannatos, 2000).

Accountability includes quality assurance, regulation for training companies that keeps them accountable for students' working conditions and outcomes, and enforcement of learning and skill standards. We code it positively 54 times, with 3 mixed and 3 negative mentions. We expect this item to help VET reform implementation because it is a key element of strong VET systems. Accountability and quality assurance enable workplace learning by balancing companies' incentives to under-invest in general training, and standards enable credential portability by equalizing qualifications within occupations and programs (Wolter & Ryan, 2011).

According to ETF (2017a), "quality assurance links the other components of a qualification system – legislation, stakeholders and institutions" (p109). Multiple sources state that elements of accountability and quality assurance are key for implementation (e.g. ETF, 1997), especially as an enabling factor for other items like decentralization (ETF, 2014c; Cedefop, 2016a). Milne (1998) argues that accountability may seem like a bigger factor for implementation than it really is, because while there is "considerable support for the concept of accountability through standards and measurement, the technical problems of system development and assessment are the focus of considerable concern" (p23).

Success Factors

The following items are still mostly positive, but we code them less frequently than the key success factors. These are not the highest priority for either reformers or researchers, and may even be revised or eliminated from this framework if they do not contribute enough.

Trade Unions were not mentioned very often in the literature, but their involvement in reforms and innovations was generally beneficial for implementation with 38 positive mentions and no others. The close interdependency between the VET system and the labor market seems to warrant not only employer involvement in decision-making, but also organizations that represent employees. One reason trade unions may not come up often is if their role is especially small in a given national context. Another is an artifact of our coding method for this item: we only coded it when we saw specific terms such as "union", "employee association" or "labor organization," but not if the source was talking about relevant stakeholders and social partners in a general way.

Kis (2009) states that trade unions are important in VET policy making as actors that can "constructively counterbalance the interest of employers" (p38). However, they can also play a negative role if they have "incentives to reduce access to shortage occupations, to maintain wages and union bargaining power" (ibid.). We have not found any evidence in the literature, that these incentives are detrimental for the implementation of change in VET systems.

High Level actors are usually at the national level of government or private-sector institutions. They are a useful actor, with 35 positive codes, 1 mixed, and 2 negative. Most of the mentions for all three items in the *Clients (Level)* category are from sources' claims that "all levels" of some actor type need to be involved for implementation to progress. Specific mentions of high-level actors usually come from legislative (i.e. Grootings, 1993) or regulatory roles (i.e. Kuczera et al., 2008b) to maintain quality and mobility throughout the new system.

However, high-level involvement is not right for all reform types. National legislative reforms like national qualifications frameworks are perfect for top government actors, but their involvement might actually hinder reform progress in cases where the scope of the reform is smaller and school-level actors need to lead the way (i.e. Cedefop, 2015a). In general, high-level actors benefit reform implementation.

Time refers to time as a resource and has to be distinguished from another item on our list, namely *Slow Pace*. These two items were among the more difficult to code, because some studies were not clear on whether it was insufficient time or inadequate speed that hindered a reform. Dorleans et al. (2011) illustrates this challenge: "at this point, the question may be asked whether the pace of the reforms is slower than expected or whether, in fact, it is the timeframe that is unrealistic (…)" (p. 14). The one mixed-coded source draws a further distinction, arguing that it is neither time alone nor pace that hindered implementation, but rather "temporal discontinuity" in which lack of time combined with improper sequencing of steps to break down implementation (Oates, 2008).

Despite the complexity, there were 36 instances where the success or failure of the implementation of a change in the VET system was dependent on time. Sometimes, however, sources expect a great deal of time, as in one case where the reform ran out of time despite lasting two decades (Rekkor, Ümarik, & Loogma, 2013).

Ownership comes up 32 times positively and once mixed. Ownership itself is a sense of control and self-direction about the reform among implementers, often teachers. This item is usually positive, with one mixed mention coming from a paper that stated ownership was not very impactful for implementation success (Comyn & Barnaart, 2010). Overall, ownership is generally positive though not very common.

Leadership is a factor that is widely believed to be critical for successful school reform, and shows up an always-positive 29 times in our sources. Hsiao et al. (2008) show the many different roles a principal can take in implementing curriculum reform in VET high schools: advocate, navigator, coordinator, consolidator, mentor, caretaker, monitor, and feedback provider. In their study on a TVET reform in Chongqing, China, Comyn and Barnaart (2010) state that "in those institutions where managers and leaders fully embraced the reforms, there have been sustainable reforms to the professional practice of teachers managers and the institutions as a whole" (p.62). Bartlett (2013) says that a big obstacle to the implementation of an EU assistance program for VET reform in Serbia has been the resistance by domestic educational actors and that "it is often useful to have a 'champion' of the reforms within the administration" (p. 342).

Mid Level actors are usually regional government members or employment representatives, and sometimes refers to mid-level managers inside a large firm. This item comes up 25 times positively and twice mixed. Regional actors in the public or private sectors offer a middle ground between totally centralized or top-down processes and totally decentralized or bottom-up processes. ETF 1999b argues that regionalism is the solution to the question of centralization or decentralization, arguing that each of the extremes comes with its own problems. Milne (1998) also points to regionalism as a solution to technical problems arising from the amount of accountability and measurement needed to run a reform from the top.

Community captures the engagement of parents, students and other people in the wider community affected by a reform. It is mentioned 17 times, always positively. Grossmann and Naanda (2006) write that low involvement of trainees in the reform process is one of the main dangers for successful implementation, as it is likely to increase their resistance to these changes (p.42-43). Parents are powerful stakeholders and involving them in the reform, among other stakeholders, fosters a sense of ownership in the community and thereby guarantees a higher degree of sustainability of the reform (ETF, 2006d).

Strong Econ is positive when a strong economy and/or low unemployment are good for VET reform implementation and negative when those conditions are bad or when a weaker economy helps implementation. It is positive 13 times, mixed once, and negative once. Kingombe (2011) states the argument for positive coding most succinctly, stating “even the world's most sophisticated and expensive programme is doomed to fail if the labour market cannot absorb the students, despite their skills and expectations" (p61). Cedefop (2012) agrees that a strong labor market might hinder implementation—possibly by lowering political will—and a weak labor market might encourage VET reform as a crisis-response measure, facilitating implementation as actors pull together to solve the problem. However, the same source points out that weak labor markets have slowed down VET implementation due to economic, administrative, and policy uncertainty problems.

Low Turnover refers to both stability and tenure of implementation staff, teachers, politicians, and other people directly responsible for implementing a change. The fourteen times this item came up in the literature, it was always positive. Reforms take time and often occur in incremental steps and changing governments can bring them to a halt (ETF, 2014a, p6). Systems in too much flux are not able to implement reforms (Shaw, 1995). Parkes et al. (2009) find that political turbulence prevents long-term planning and continuity of policies like VET reforms.

Ed Quality is positive when having a strong existing education system helps support implementation or a weak one hurts, and negative when strong education hinders VET reform or a weak one helps. It comes up only five times in our sources, always positively. Wallenborn (2010) argues that weak education quality and penetration in an emerging market prevented the VET reform there from progressing because there were no qualified trainers available. Other sources make similar arguments, or point out that stigma from a bad existing system attaches to reforms and prevents them from building momentum (Cedefop, 2015b; Paik, 2014).

Need further research

Though they are mentioned frequently, we code the items in this section as either mixed or negative rather than consistently positive like we might expect. These are a good starting point for future research, because there is some element of counterintuitive behavior, conditionality, or complication at play.

Foreign Aid is knowledge sharing, advice, assistance, or even policy borrowing from international partners. International cooperation is very common in VET, especially since international donors use VET for development, the EU encourages VET, and reforms often use international best practices from famously strong systems. In our review, *Foreign Aid* has 35 positive mentions, 13 mixed, and 8 negative.

The most successful international actor at implementing VET reform appears to be the European Union, which uses soft policy, monitoring, and evaluation instead of a top-down approach to drive reform (e.g. Manuel Galvin Arribas, 2016). A common argument is that outside help only facilitates implementation when it fits local context and cooperation (e.g. Grollmann & Ruth, 2006). ETF (2017a) recommends a solution to this challenge, "Different systems need to be fit for purpose, that's why they are different. To learn from others, look at the commonalities rather than the differences" (p19). Some sources gave evidence for situations when international advice is specifically helpful or hurtful to implementation. In some cases, foreign change agents are simply not sufficient to drive implementation, even with other success factors (Mead Richardson, 2013). When international help hurts implementation, it may be because donors are uncoordinated and conflicting (Corradini et al., 2011) or, as Bartlett (2013) theorizes, because long chains of principals and agents create challenges.

Decentralize is another complex and difficult-to-define item, though it seemed clear at first. It is mentioned 14 times positively, 11 times mixed, and 9 times negatively. For this item and *Bottom-Up,* multiple sources advocated balancing the two extremes (e.g. Sebele, 2015). One of the issues is that, unlike general education, VET needs to match the labor market and needs to be sufficiently similar across regions that individuals can move without losing the value of their credentials. ETF (1999b) recommends regionalism as the balance between centralization and decentralization, stating that decentralizing VET reform is mixed. Multiple sources argue for centralized coordination and oversight with individual institutions having autonomy (Atchoarena & Delluc, 2002), enabled by accountability (ETF, 2014c; Cedefop, 2016a). ETF (2017a) states that "implementation is faster where ministries can focus on policy, and executive functions are delegated to agencies…However, putting too many tasks under one roof can blur responsibilities between the agency and other actors…Therefore, concentrating all related tasks in a single technical agency is not a feasible solution" (p. 85).

Bottom-Up is another item where sources converge on recommending a mixed approach. Its mentions are 18 positive, 10 mixed, and 2 negative. Viertel and Grootings (2001) argue for a "complementary top-down and bottom-up approach" (p1), and Malley and Keating (2000) point out that both approaches have worked. Sultana (2008) takes a policy-by-policy approach, saying that "some policies are better implemented in a top-down manner, while others are more likely to have staying power if they are incubated within the school environment itself" (p19). Czesand (1999) points out one of the VET-specific issues around this item, which is that bottom-up policies might be easier to implement but will be inconsistent—potentially making graduates unemployable—but top-down policies may never be implemented fully. VET also deals with more institutions than general education, which is why Cedefop (2015b) considers that bottom-up is probably better but top-down is more common because it helps clear out institutional cobwebs.

Formalism encompasses laws and legal frameworks. It comes up 39 times positively, 7 times mixed, and 3 times negatively in our coding. Although legal and administrative acts are generally considered prerequisites of reform or innovation, they do not guarantee successful implementation on their own. According to ETF (2017a), "laws can be enablers, but can also create rigidities that only inhibit reform" (p. 18). Instead of a process enabling reform, laws might be a goal at the end of the reform—particularly since formal systems might work better but can be harder to implement (Eichhorst, Rodríguez-Planas, Schmidl, & Zimmermann, 2012).

Low Level stands for involvement of local and low level actors in the implementation process. Mentions of this item are predominantly positive (43), but there are also 4 mixed mentions. Low-level actors are often the most closely engaged with education reforms, because they put laws and regulations into practice. A study by Powell (2001) comparing the implementation of TVET projects in Jamaica and Gambia has shown that local involvement is especially important when a project is initiated by a foreign aid agency, as it guarantees that local context is taken into account and creates a sense of ownership in the recipient country.

Piloting refers to an iterative or learning-based process of that somewhat mixes policy design and implementation by testing ideas in small settings before implementing them system-wide. It is positive 38 times, mixed 4 times, and negative once. Piloting should improve implementation by letting reforms experiment with new actors, models, and relationships (Stoica, 2003). Oates (2008) blames lack of piloting for previous implementation failures, and Grootings (1993) points out that piloting lets reformers start where they are and improve on the road. Pilot schools specifically have strengths and weaknesses according to Viertel & Grootings (2001), and Stoica (2003) notes they can be expensive.

Slow Pace is a difficult item to code because we have to differentiate it from *Time* as a resource, and the literature is not always clear on this distinction as mentioned earlier. This item is coded positive 33 times, mixed 4 times, and negative 3 times. Hart and Rogojinaru (2007) point out that VET reforms are uniquely related to labor market demand, and risk moving too slowly to satisfy employment-related actors. Ertl (2000) agrees, pointing out that speed is fine as long as the plan is very clear. Mitchell, Clayton, Hedberg, and Paine (2003) argue that fast and radical change are difficult for teachers, making them oppose the reform and thereby hindering implementation. Finally, Oates (2008) and Cedefop (2009d) make mixed arguments that the problem is temporal discontinuity more than speed and that VET reforms are a multispeed process, respectively.

Incremental reforms are moderate in scope, compared to radical reforms that have very large scope or make very big changes. Incremental strategies seem to help implementation, with 13 positive codes, 3 mixed codes, and 6 negative codes. Most sources found radical reforms overambitious (e.g. Hummelsheim & Baur, 2014), including Comyn and Barnaart (2010), which found that the reform it described failed to implement because it was too radical for its institutional structure. VET systems include many more institutions than general education because they need to include labor and employment actors, so institutional issues can affect VET differently. In contrast, Strathdee (2011) found that its reform lost radical nature and became incremental, failing to implement its full scope. Hart and Rogojinaru (2007) argue that scope is not important as long as partners agree on what it is, and S73 states radical change even of institutions is possible as ideas change.

Looking at individual items is instructive for a more in-depth look at how things behave in the literature and where some of our coding comes from, but we also need to look at broader trends across literature subsamples. In the next section, we look at sources by type, publication year, development status, and continent to draw further insights about both VET reform implementation and the literature itself.

Trends and patterns

The effects of items on implementation are not concrete enough for a traditional meta-analysis, but we can look at differences in item mentions across broad groups of literature. We examine the differences between older and newer sources, peer-reviewed and non-peer-reviewed sources, sources dealing with

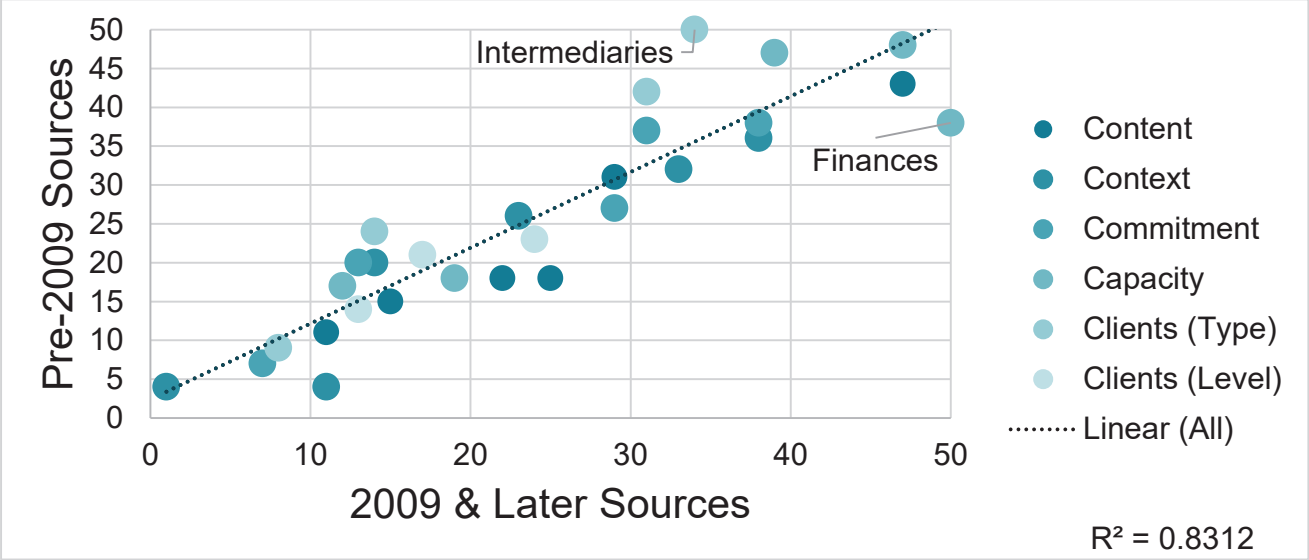
reforms on different continents, and sources dealing with reforms in developed and developing countries. These give us a sense of patterns, gaps, or biases in the literature.

Throughout this section, we compare subsamples by regressing one group on another using simple linear regression. Figures show the comparisons graphically, with trend lines showing the regression line. We highlight items more than two standard deviations from the mean, and full tables are in appendix Tables A2-A5.

Source age

Publication years range from 1984 to 2017, skewing towards more recent literature with a mean year of 2006 and a median of 2009. We divided the sample into approximate halves before 2009 and from 2009 onwards, with 87 sources in the former and 90 in the latter group. The groups are very similar (R^2=0.83), shown in Figure 2. The only major differences are *Finances* coming up more in older sources and *Intermediaries* coming up more in recent sources.

Figure 2: Sources from 2009 and later vs. pre-2009 sources



The similarity between older and newer sources implies that the literature has not changed or progressed much in the last few decades. This is most likely the result of isolated silos, where researchers and research institutions tend to focus on their own project or projects without much reference to other sources. Because there are hardly any reviews or frameworks related to VET reform implementation, it has been difficult to bring together findings from multiple case studies. The consistency also implies that the existing literature has come to agreement on what matters, meaning there is more to build on than we might have expected.

Source type

Of the 177 coded sources, 62 are peer-reviewed literature, 49 are books, and 66 are grey literature—mostly policy reports from international agencies. We combined the books and grey literature to compare against the peer-reviewed scholarly literature. Because there were more non-scholarly sources and

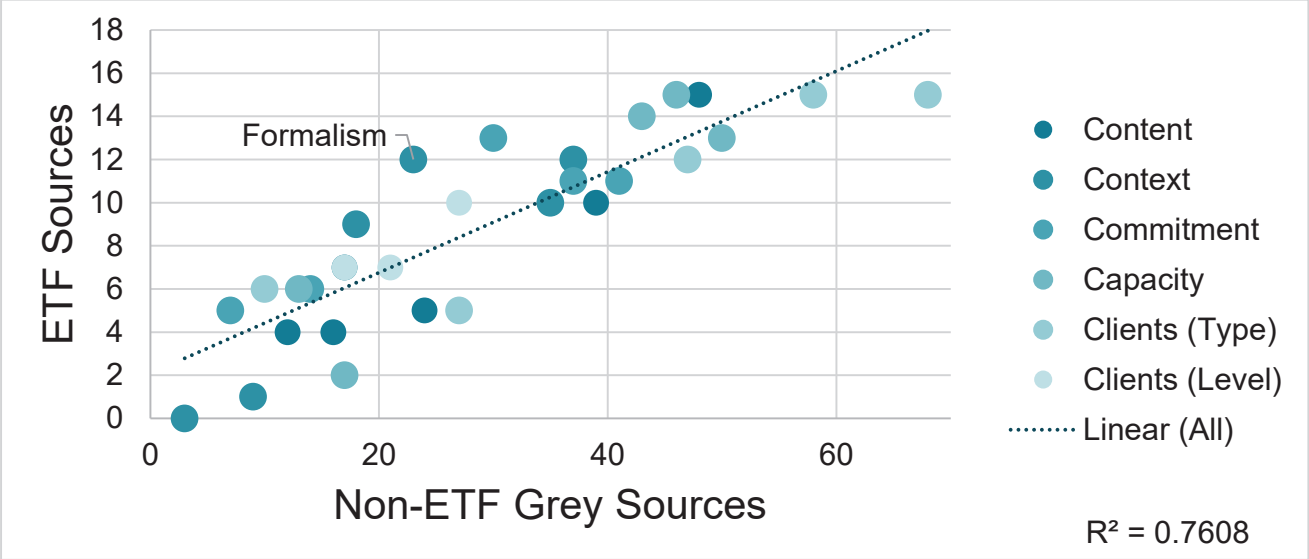
because they tended to be longer, there are more mentions overall in non-scholarly (1,116) than scholarly (422) literature. This means policy reports and books are more prominent in our review than journal articles, accurately reflecting the sources of knowledge in the field. Results by source type are in Figure 3.

Figure 3: Scholarly vs. grey sources

Overall the two literature types are similar in total mentions by item, though not very strongly (R^2=0.49). Non -scholarly literature's mentions of *Intermediaries* and *Employers* drives this difference. The non-scholarly literature seems to be noticing the VET-specific actors that need to be involved for reform to succeed.

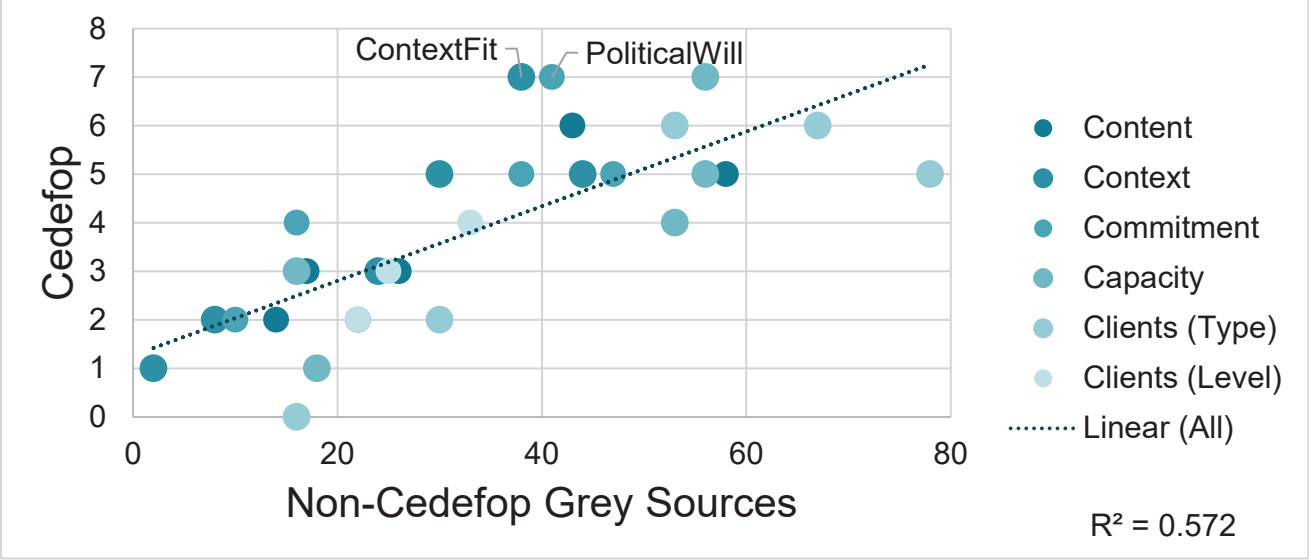
Three major research organizations make up large parts of the grey literature: ETF, Cedefop, and the OECD. We need to make sure their idiosyncrasies are not driving results, so we perform separate subsample analyses of these compared to the rest of the grey literature. ETF, shown in Figure 4, is most similar to all other grey sources (R^2=0.76). Its only significant bias is being more likely to mention *Formalism*, driven almost entirely by its studies of post-Soviet countries where it found over-formalism to be a major barrier.

Figure 4: ETF vs. other grey sources



The next major organization is Cedefop, which is still broadly similar to the rest of the grey literature (R^2=0.57). This organization mentions *Context Fit* and *Political Will* much more than grey sources from other organizations, shown in Figure 5.

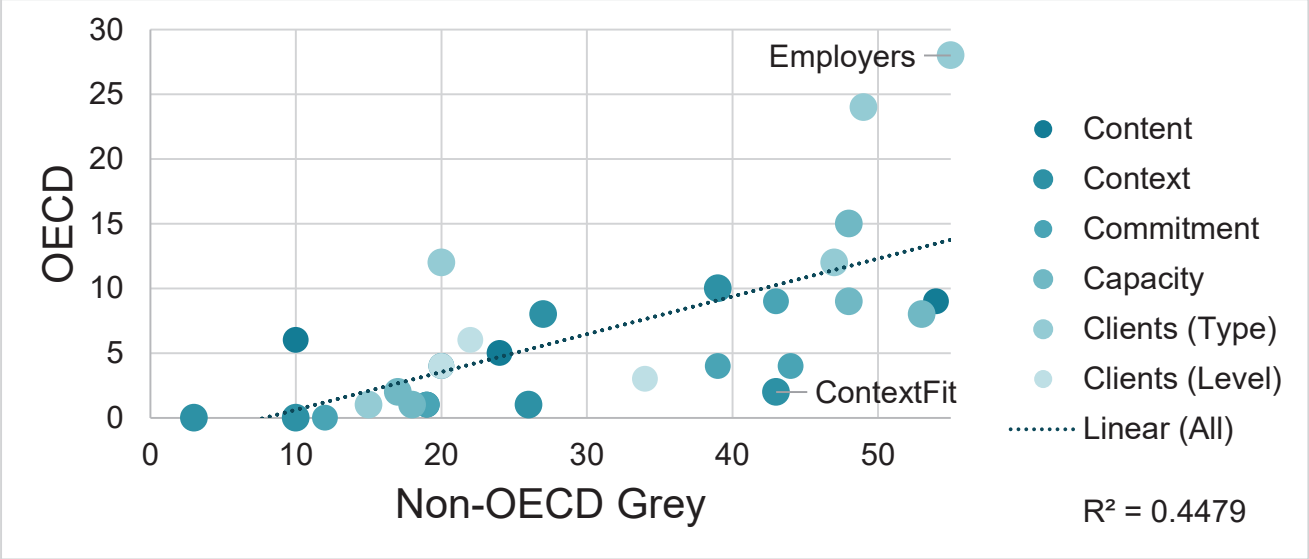
Figure 5: Cedefop vs. other grey sources



Finally the OECD has the most sources and is the least similar to the remaining grey literature (R^2=0.45). Shown in Figure 6, the OECD mentions *Employers* much more often than other sources, along with nearly all items in the category Clients (Type). The OECD is much less likely to mention *Context Fit*, either because this comes up less or because the focus on actors somehow accounts for context, with institutions' involvement reducing the need to strategize for their needs. Many of our OECD studies are part of the *Learning for Jobs* study, which includes many similar studies of different countries, including

an implementation section in each. This project in general is very focused on actors, and might drive the OECD results.

Figure 6: OECD vs. other grey sources



In addition to the individual biases or focus items of individual organizations, there is also the possibility that non-English-speaking organizations are not coming up in our search. VET research organizations like Korea's KRIVET and Switzerland's SFIVET publish in English but more often in their countries' native languages, so we will have missed them and similar organizations.

One potential source of bias that might arise from certain strands of grey literature is from evaluations of an implementation process by the person or people doing the implementing. Internal and external evaluation might yield different insights, and there might be a resulting bias. The audience of a report also affects findings—for example, a report for a ministry of education will emphasize contact with employers, while one for an employer-led body might not need to. One solution would be for the field to decide on a simple framework of reporting standards so grey sources can be a reliable part of the literature.

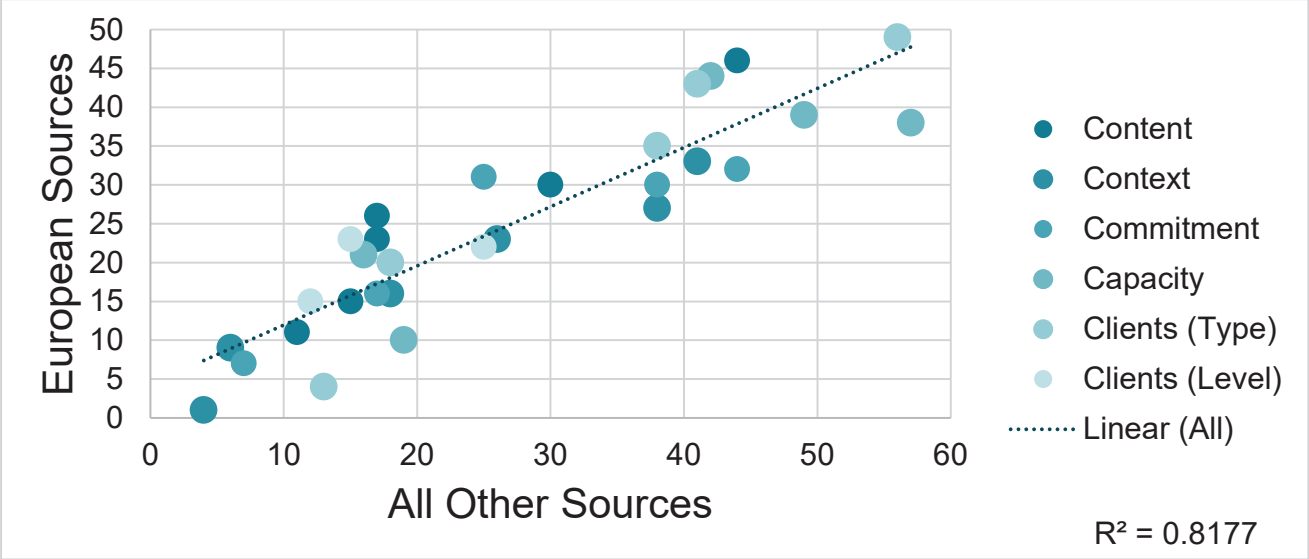
With grey literature being such an important part of the body of knowledge in this field, scholarly research needs to both reflect and inform that work. Some authors, notably Pilz, Oates, and Grootings, show up in both scholarly and grey sources. These are indications that there is crossover between the two types of work, but scholarly work can provide a clearer and more unified set of hypotheses to help grey literature participate in the scholarly conversation more productively.

Continent

The biggest bias in the literature is towards European countries, which make up 50% of our sources. Of the rest, 11% deal with Asian countries, 10% African, 6% Oceanic, 5% North American, and 2% South American. The remaining 16% of sources cover multiple countries across more than one continent. The general pattern of mentions is strikingly similar across continents, indicating that the pattern of results is not driven by continent-level differences. Figure 7 shows that European sources are very similar to all

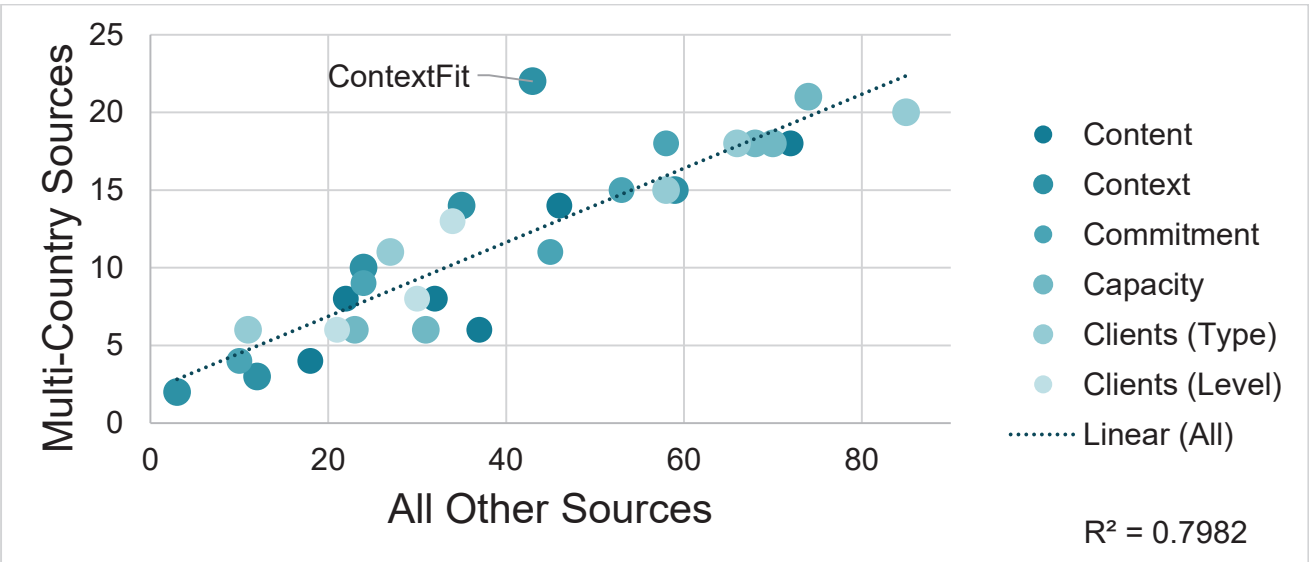
other sources (R^2=0.82), with no items standing out. This shows that the many European sources are amplifying rather than driving our results.

Figure 7: European sources vs. all other sources



Multi-continent sources are also common, and strongly agree with the general pattern (R^2=0.80). These sources mention *Context Fit* more often than all other sources, as shown in Figure 8. Multi-continent sources look at multiple reforms across contexts, so it makes sense that they would emphasize that each reform has to be right for its location for implementation to succeed.

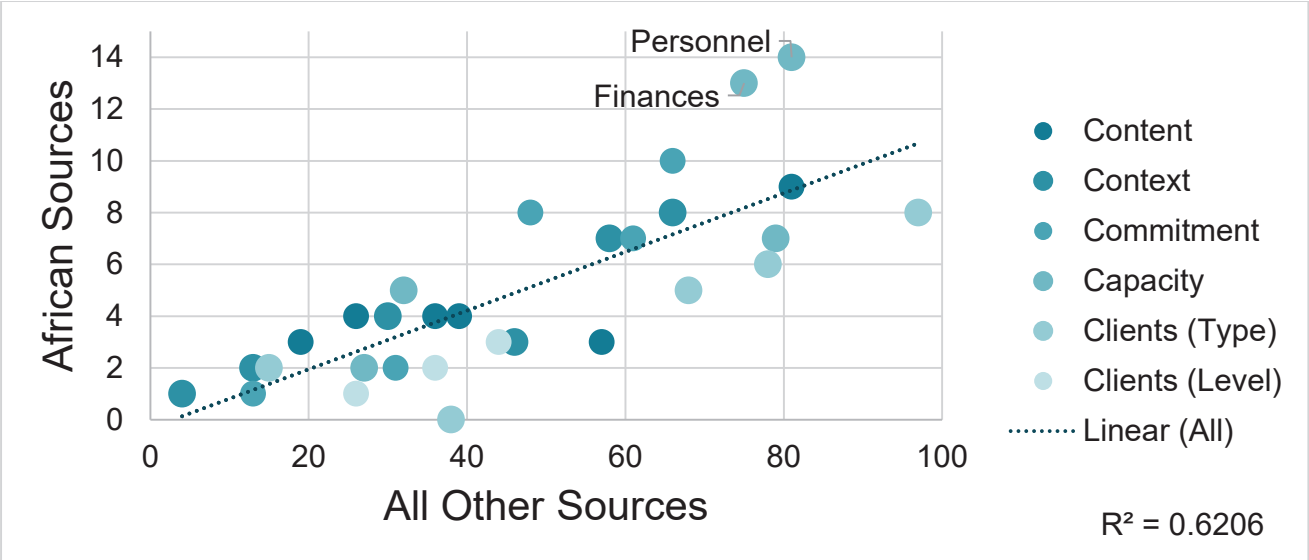
Figure 8: Multi-continent sources vs. all other sources



African-country sources are similar overall to others, though less so than European or multi-continent sources (R^2=0.62). They are more likely to mention *Personnel* and *Finances*, as shown in Figure 9. Many

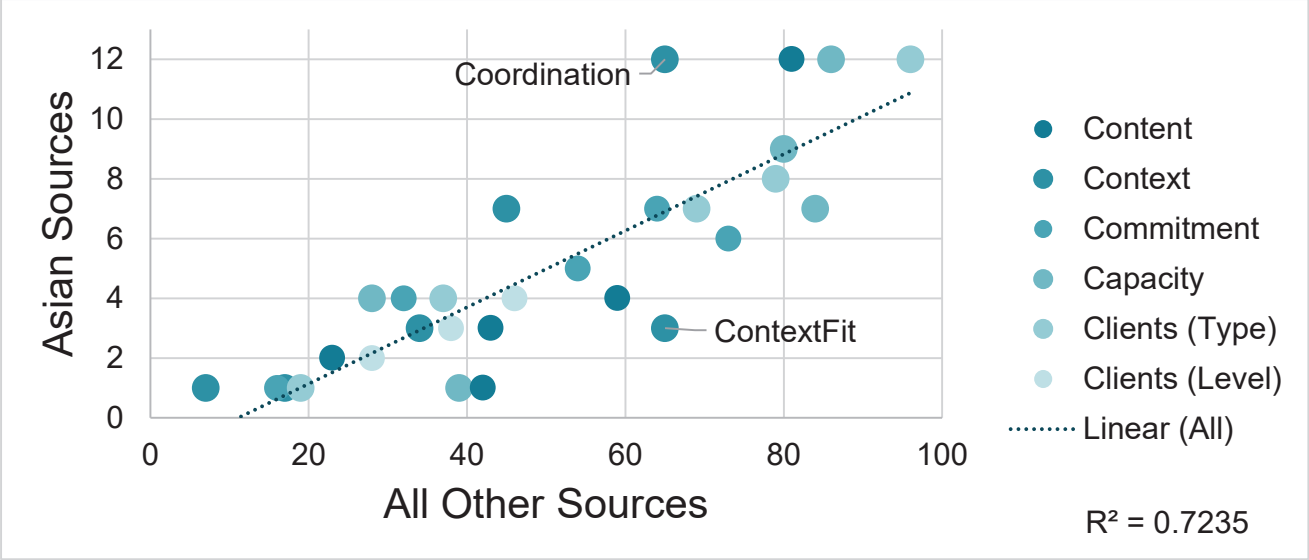
African countries are poor, so it might be difficult to find the resources and experienced people that can help implementation succeed. Another explanation is that because African countries do not have experience with formal VET systems, such reforms are not a priority for resources and skilled implementers.

Figure 9: African sources vs. all other sources



Asian-country sources are more similar to others than African sources (R^2=0.72), with the exceptions of mentioning *Coordination* more often and *Context Fit* less often. Most of our Asian sources are in Korea and China, and tend to be top-down reforms where organization is a greater concern than matching the existing system. Figure 10 summarizes the pattern.

Figure 10: Asian sources vs. all other sources



We do not interpret Oceana or North and South America in detail because there are not enough sources on those continents. There are three major explanations for the gap. First, our search is only conducted

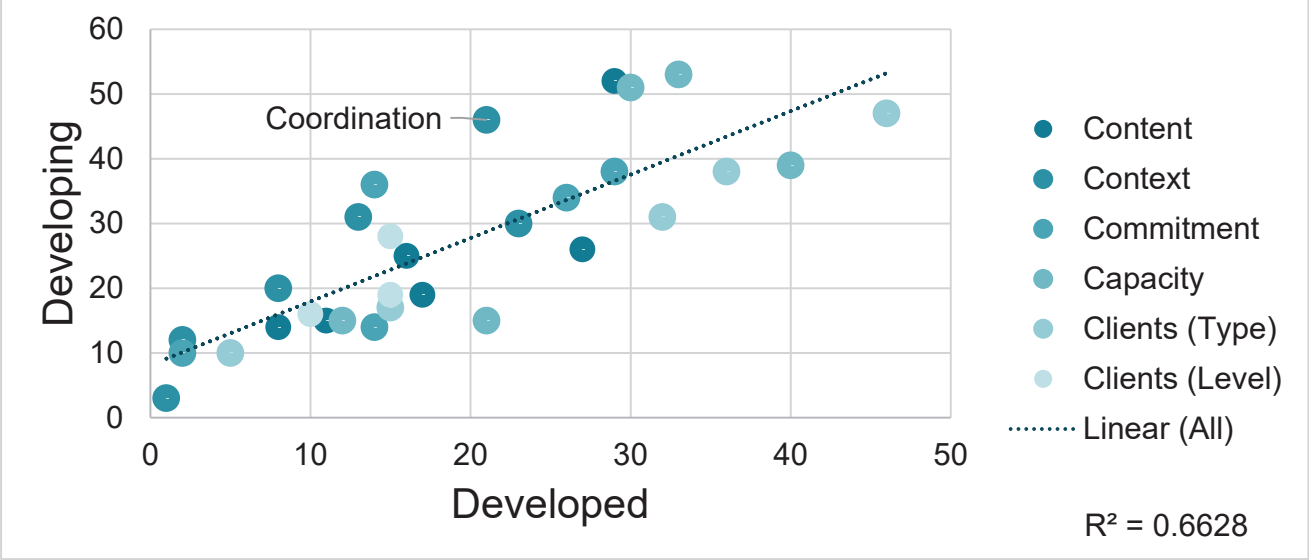
in English and there might be existing sources—especially in North and South America—that are written only in other languages or using alternative terminologies. The language bias will also affect our results in continents that do show up, especially with older sources on European VET reforms. Second, there might not be much VET in the countries on those continents, or at least not much formal VET. Finally, the gap could occur because VET is not a research priority, even if it does exist.

Looking at trends by continent, we can conclude that the results are heavily skewed towards European countries, but not driven by them since the pattern is consistent between European and non-European sources. Multi-continent studies highlight the importance of fitting the reform to its context for implementation success. African studies imply financial and human resources are a major factor when they are missing, and so might be something like a necessary condition. Asian sources are more often top-down reforms, so their focus is less on fitting local context and more on coordinating change among various actors. Perhaps the most important contribution of this subsample is what it cannot tell us: patterns from non-European countries, especially those in North and South America, are missing from the literature.

Development status

We find 81 sources each dealing with developed and developing countries, plus 15 sources that include multiple countries of mixed development status. Sources in developed and developing contexts are generally similar but not identical (R^2=0.66). Developed-country sources overall make fewer mentions than those on developing countries (571 and 804, respectively) and make more mixed mentions. Results by development status are in Figure 11. The only significant difference between the groups is that developing sources mention *Coordination* more often.

Figure 11: Results by development status

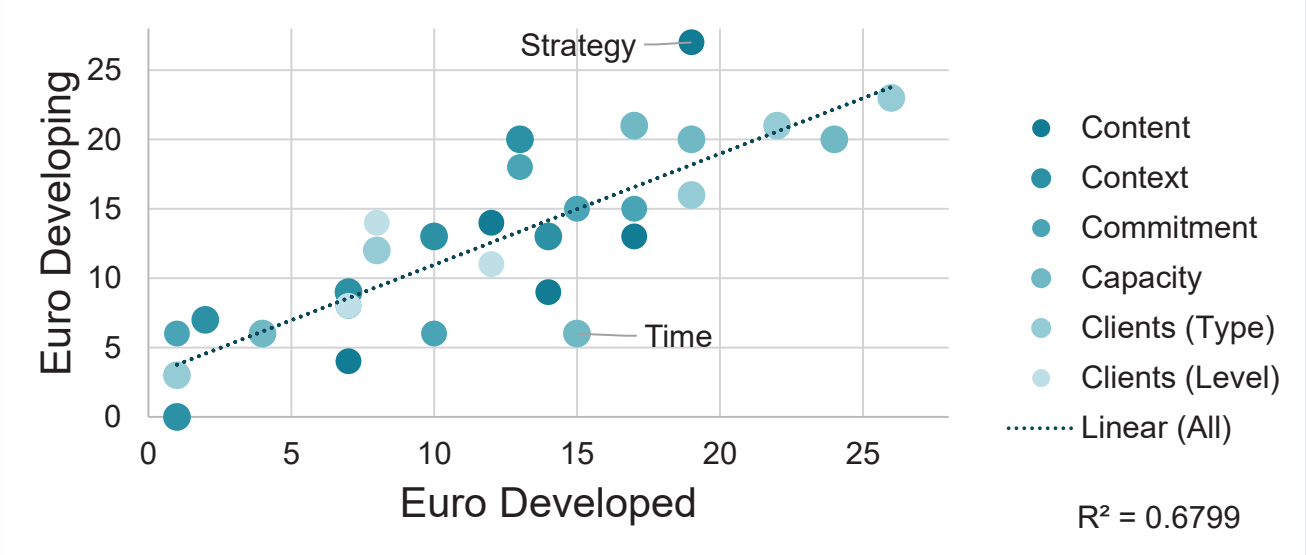


Developing countries probably have more total mentions because they are more often featured in grey literature, and their more mixed mentions probably reflects the challenges and complications of implementing VET reform in developing contexts. Developing sources mention context factors more often, and Clients (Type) are more frequent in the developed literature, implying that there may be an

order or priority list to which items matter. Coordinating among actors is especially critical in developing countries.

Because European countries are so dominant in the sample, it could be that the difference between developed and developing sources is actually coming from a continent difference. However, we have a number of developing European countries in the sample thanks to post-Soviet reform efforts in Eastern European countries. When we look at developing and developed countries within Europe (Figure 12), we see a similar overall pattern to the overall development-status comparison. European developing countries are broadly similar to developing countries (R^2=0.68), mentioning *Strategy* more often and *Time* less often. Developing sources still mention Context factors more, but Clients (Type) are less specific to developed sources.

Figure 12: Developed vs. developing sources within Europe



This subsample shows that, while there are some specificities by development status, the general trend of what matters is consistent. It also implies that some factors might be more foundational, while others become important in improving existing VET systems. It hints that some factors may be more like necessary conditions, while others behave more like sufficient conditions.

Limitations

This literature review, like every other, has limitations that put boundaries on how far we can take our interpretations. First, we have all the limitations and biases of the literature itself. The literature we review is dominated by European-continent sources and by grey literature, even if the subsample analysis shows that these groups do not drive the results. We search only in English, but a multi-lingual review would capture countries that do not write about their reform implementation experiences in English. Finally, we make a great effort to be systematic but still chose to include snowballed sources in our sample, which limits replicability.

Our limitations also indicate future directions for research and further review. We prioritized feasibility and a complete view of the literature over context and exclusivity. Identifying success factors and barriers

is a defining trait of the second wave of implementation literature, despite criticism that this method identifies factors without specifying a model of implementation (Gornitzka et al. 2005) and does not take context into account (OECD 2009). We hope the trends, observations, and questions we draw from the literature will contribute to a context-based model in the future.

We prioritized implementation process over reforms' content or outcome. Viennet and Pont (2017) argue that implementation research should include impact, and Honig (2009) states that the objectives and tools in a reform policy affect its implementation challenges. We agree, but focus on synthesizing the literature in the field. We did notice that there are a number of studies on national qualifications frameworks, so future researchers might use these as a specific type of reform in which to explore trends.

Our list of items is not perfect. Our goal was to develop a list of items that is, as much as possible, mutually exclusive and collectively exhaustive. We used four rounds of test coding to revise our framework, but there may still be items that are dropped, added, or split based on future research and theory. We provide broad items to simplify and synthesize the literature, but important items might still be too broad—*Personnel* refers both to teacher capacity and general institutional capacity—and others might be missing.

Coding is a challenge because terminology is inconsistent in the literature. For example, *Fast Pace* is not always differentiable from *Time*. A paper's statement that its reform failed because it moved too fast might mean that the pace was too fast, or it might be a slightly oblique way of saying that it needed more time. For this review, when an author states that an item helped or hurt implementation we did our best to code them literally based on their usage definitions (Popper, 2014/1963). This is why we chose such a time-consuming method of resolving disagreements. Consistent, theory-based definitions of each item and implementation itself will synthesize the literature more effectively.

Our method does not account for items' interactions or relative importance. Some sources make claims about item relationships, such as Oates's (2008) claim that temporal discontinuity is a more hindering barrier than pace alone, or Akyeampong's (2002) that political will is not sufficient for implementation without a good strategy. We can code these as one item being irrelevant and another positive, but that does not capture the nature of their stated interaction. We also valence rather than strength of mentions, so we cannot differentiate strong from weak items. It would be beyond the scope of this holistic review to code so many papers in such detail, but future research focused on a specific item or set of items could include strength as well as number of mentions. This might uncover the expected "synergistic effects" (Nilsen, 2015, p5) among items (Winter, 2012).

Conclusions and further research

The field of VET reform implementation is distinct from general education reform implementation, somewhat opaque, and contains more agreement and evidence than we expected to find. While some of the key factors for VET are similar to those in general education, the actor types and levels in VET are not identical. Although institutional capacity and resources are important in all types of reform, VET reform relies on more diverse institutions and different types of resources.

The VET reform implementation literature is not easy to get through. It is heavily reliant on non-scholarly sources, not organized by a shared theoretical perspective, and infrequently cataloged. There are some topics where sources are very difficult to interpret, and it is often difficult to tell hypothetical from empirical

reasoning. As a field, we can be clearer about our shared conclusions, points of disagreement, and recommendations for the implementers who rely on our evidence.

Despite its opacity, this field is one of surprising agreement. Sources have clear preferences for what matters, and usually explore disagreements in some depth. There is more evidence than we expected, and many detailed case studies we can mine for new insights. Researchers in this field universally feel a sense of urgency around getting VET right and a sense of enormous potential for the impact a well-designed, successfully implemented, and continually updated VET system can have on young people, economies, and societies.

This review is an effort to make sense of a field with a lot of potential and a lot of information hidden in rather complicated depths. More than anything, its goal is to encourage further research. The items, categories, and trends we describe are specific to VET and can contribute to hypothesis-testing, explorations of interactions and context effects, and other key issues. VET needs its own group of key implementation variables, to enable new directions. The VET implementation literature is dominated by case studies and policy reports, and generally lacks synthesis. This review is an effort to summarize its main findings so researchers and practitioners can build upon them.

We have noted future research directions throughout this review, but there are a few other topics to add. The first is the challenge of theory building. The best starting point is systematically consolidating our empirical knowledge base. Lack of theory makes it difficult to develop testable hypotheses, but the trends and findings of this review can be a starting point for a similar type of study in VET implementation.

Part of the hypothesis-testing agenda should be to test similar factors in different contexts, and small groups of factors in different configurations. Context dependence and interdependence among factors is a key issue in VET reform implementation and one we do not address here. Systematic case study comparisons is another valuable approach to addressing complexity issues. At the same time, we can investigate what it means for a VET reform to be successful or not, which would give us an outcome variable to assess implementation processes quantitatively.

Further research can also work on key topics around implementation. We need a means of quantifying implementation success—possibly separate from outcomes. We need to accumulate empirical results so we can test the interactions and relative importance of key variables identified here. We can move towards a theory or at least an empirically validated determinant framework that can go on to inform a theory. Finally, we need to make our framework actionable (Viennet and Pont, 2017) and provide usable recommendations for practitioners that increase the probability of successful implementation.

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Appendix

Table A1: Search terms and databases

Database	Syntax	Syntax explanation	Filters	Date of search	No. of results	Coded
EBSCO Education Source	TI ("vocational education" OR VET OR TVET) AND (AB implement* OR SU implement* OR TI implement*)	Title (TI), abstract (AB), subject terms (SU)	Full text	22.1.2018	65	18
ERIC	title:("vocational education" OR VET OR TVET) AND (abstract:(change OR changes OR changing OR reform OR reforms OR reforming OR innovate OR innovates OR innovation OR innovating) OR title:(change OR changes OR changing OR reform OR reforms OR reforming OR innovate OR innovates OR innovation OR innovating)) AND (abstract:(implementation OR implementing OR implement OR implements) OR title:(implementation OR implementing OR implement OR implements))		Full text; Publication types: reports (research/descriptive/evaluative/ general), journal articles, ERIC publications, books	23.1.2018	185	14
VocedPlus	(tm_metadata.title:("vocational education" OR TVET OR VET)) AND (tm_metadata.title:(change OR changes OR changing OR reform OR reforms OR reforming OR innovate OR innovates OR innovation OR innovating) OR tm_metadata.abstract:(change OR changes OR changing OR reform OR reforms OR reforming OR innovate OR innovates OR innovation OR innovating)) AND (tm_metadata.abstract:(implementation		Full text; Ressource types: reports, articles, theses, papers, working papers, books	23.1.2018	198	34

	OR implementing OR implement OR implements) OR tm_metadata.title:(implementation OR implementing OR implement OR implements)) AND bs_metadata.fulltext:true					
Science Direct	ttl("vocational education" OR VET OR TVET) AND tak(implement*)	Title (ttl), title, abstract, and author or publisher's keywords (tak)		24.1.2018	27	4
Web of Science	TI=("vocational education" OR VET OR TVET) AND TI=(implement* OR reform* OR chang* OR innovat*)	Title (TI)	Categories: Education educational research, psychology educational, education scientific disciplines, education special, Resource types: articles, book chapters, books	25.1.2018	107	7
JSTOR	(ti:("vocational education" OR TVET OR VET) OR tb:("vocational education" OR TVET OR VET)) AND implement* AND (chang* OR reform* OR innovat*)	Title (ti OR tb), Language: English		24.1.2018	132	14
SAGE	[[Publication Title "vocational education"] OR [Publication Title vet] OR [Publication Title tvet]] AND [[Abstract reform*] OR [Abstract chang*] OR [Abstract innovat*] OR [Abstract implement*]]		Full Access	23.1.2018	31	8
Taylor and Francis Online	[[Publication Title: "vocational education"] OR [Publication Title: vet] OR [Publication Title: tvet]] AND [[Publication Title: implement*] OR [Publication Title: reform*] OR [Publication Title: chang*] OR [Publication Title: innovat*]]		Full Access	25.1.2018	61	5

UNESCO-UNEVOC Publications	Title (implement; reform; innovat; chang) *Wildcards (e.g. the asterik sign) are not allowed, but search for word stem (e.g. implement) also looks for variations (e.g. implementation, implementing, implements). Each term (implement, reform, innovat, chang) was searched seperately. The number of results taken together from all searches was 318.*		24.1.2018	318	14
OECD ilibrary	Search Results containing '"vocational education" OR VET OR TVET' AND Title, Abstract, Authors, Keyword or ISSN/ISBN/DOI containing 'implement*' Restricted to Language(s) English Restricted to Theme Education in content type BOOK SERIES OR in content type BOOK OR in content type CHAPTER OR in content type JOURNAL OR in content type ARTICLE OR in content type ANNUAL OR in content type WORKING PAPER SERIES OR in content type WORKING PAPER Published Between 1900 and 2018	Theme: Education; Content type: book series, books, chapters, journals, articles, annuals, working paper series, working papers	25.1.2018	20	13
European Commission Find-eR	title("vocational education" OR VET OR TVET) AND title(implement* OR reform* OR chang* OR innovat*)		25.1.2018	140	8
ETF Publications Catalogue	*- Categories ("topics"): VET System Assessment, Qualifications Systems, Learning And Teaching In VET, VET Quality Assurance, VET Governance*		24.1.2018	334	19
Cedefop	*- Categories ("tags"): apprenticeship, comparative analysis, EQF, education and training policy, education and training system, national policy, National Qualifications Framework, vocational education and training*		24.1.2018	217	15

Table A2: Subsamples by source age, type, and development status

Category	Item	Source Age			Source Type			Development Status		
		Pre-2009	2009 On	Standard Residual	Scholarly	Grey	Standard Residual	Develop-ed	Develop-ing	Standard Residual
Content	Strategy	47	43	-0.88	27	63	0.34	29	52	1.89
	Accountability	29	31	0.05	11	49	1.15	27	26	-1.05
	Piloting	25	18	-1.47	14	29	-0.55	16	25	0.14
	Slow Pace	22	18	-0.98	16	24	-1.12	17	19	-0.71
	Bottom-Up	15	15	-0.34	10	20	-0.73	11	15	-0.48
	Incremental	11	11	-0.36	6	16	-0.56	8	14	-0.24
Context	Coordination	38	36	-0.58	25	49	-0.40	21	46	2.11
	Context Fit	33	32	-0.43	20	45	-0.12	23	30	-0.08
	Decentralize	14	20	0.66	7	27	0.08	8	20	0.49
	Formalism	23	26	0.19	14	35	-0.14	13	31	1.24
	Strong Econ	11	4	-1.53	5	10	-0.86	2	12	0.23
	Ed Quality	1	4	0.10	2	3	-1.01	1	3	-0.75
Commitment	Political Will	38	38	-0.25	28	48	-0.80	29	38	0.17
	Cooperation	31	37	0.73	16	52	0.80	26	34	0.05
	Foreign Aid	29	27	-0.62	13	43	0.51	14	36	1.73
	Ownership	13	20	0.82	13	20	-1.06	14	14	-0.96
	Low Turnover	7	7	-0.38	2	12	-0.39	2	10	-0.01
Capacity	Personnel	47	48	-0.04	34	61	-0.57	33	53	1.53
	Finances	50	38	-2.21	31	57	-0.52	30	51	1.65
	Research	39	47	1.10	23	63	0.78	40	39	-1.02
	Time	19	18	-0.49	18	19	-1.68	21	15	-1.68
	Leadership	12	17	0.48	10	19	-0.80	12	15	-0.60
Clients (Type)	Employers	47	58	1.63	22	83	2.26	46	47	-0.76
	Educators	31	42	1.57	14	59	1.50	32	31	-1.04
	Intermediaries	34	50	2.42	11	73	2.79	36	38	-0.66
	Trade Unions	14	24	1.33	6	32	0.54	15	17	-0.72
	Community	8	9	-0.20	1	16	-0.01	5	10	-0.37
Clients (Level)	Low Level	24	23	-0.47	10	37	0.44	15	28	0.63
	High Level	17	21	0.34	10	28	-0.18	15	19	-0.47
	Mid Level	13	14	-0.18	3	24	0.32	10	16	-0.24
Totals / R^2		679	735	R^2=0.87	422	1116	R^2 = 0.49	571	804	R^2 = 0.66

Notes: "Standardized Residuals" are the difference between expected and actual values divided by the standard deviation of differences.
Items two or more standard deviations from the expected value are highlighted in red ($p<0.05$) and those further than 1.5 standard deviation from the expected value are highlighted in yellow ($p<0.14$).

Table A3: Subsample by continent (excluding low-incidence continents)

Category	Item	Multi-Continent			Europe			Asia			Africa		
		Total - Multis	Multi	Std. Residual	Total - Europe	Europe	Std. Residual	Total - Asia	Asia	Std. Residual	Total - Africa	Africa	Std. Residual
Content	Strategy	72	18	-0.48	44	46	1.48	81	12	1.58	81	9	0.06
	Accountability	46	14	0.35	30	30	0.51	59	4	-1.11	57	3	-1.44
	Piloting	37	6	-1.86	17	26	1.58	43	3	-0.56	39	4	-0.05
	Slow Pace	32	8	-0.65	17	23	1.04	42	1	-1.54	36	4	0.11
	Bottom-Up	22	8	0.25	15	15	-0.14	32	1	-0.87	26	4	0.63
	Incremental	18	4	-0.90	11	11	-0.31	23	2	0.25	19	3	0.53
Context	Coordination	59	15	-0.44	41	33	-0.47	65	12	2.65	66	8	0.38
	Context Fit	43	22	3.64	38	27	-1.14	65	3	-2.03	58	7	0.34
	Decentralize	24	10	0.82	18	16	-0.37	34	3	0.04	30	4	0.42
	Formalism	35	14	1.34	26	23	-0.21	45	7	1.38	46	3	-0.87
	Strong Econ	12	3	-0.74	6	9	0.01	17	1	0.13	13	2	0.39
	Ed Quality	3	2	-0.31	4	1	-1.16	7	1	0.79	4	1	0.40
Commitment	Political Will	58	18	0.78	44	32	-1.07	73	6	-1.00	66	10	1.30
	Cooperation	53	15	0.10	38	30	-0.60	64	7	0.12	61	7	0.18
	Foreign Aid	45	11	-0.69	25	31	1.38	54	5	-0.26	48	8	1.32
	Ownership	24	9	0.44	17	16	-0.24	32	4	0.69	31	2	-0.55
	Low Turnover	10	4	-0.18	7	7	-0.49	16	1	0.19	13	1	-0.07
Capacity	Personnel	74	21	0.48	57	38	-1.78	86	12	1.25	81	14	2.35
	Finances	70	18	-0.30	49	39	-0.49	84	7	-1.21	75	13	2.21
	Research	68	18	-0.12	42	44	1.39	80	9	0.09	79	7	-0.75
	Time	31	6	-1.32	16	21	0.81	39	1	-1.34	32	5	0.78
	Leadership	23	6	-0.60	19	10	-1.60	28	4	0.95	27	2	-0.34
Clients (Type)	Employers	85	20	-0.89	56	49	0.36	96	12	0.59	97	8	-1.23
	Educators	58	15	-0.35	38	35	0.31	69	7	-0.22	68	5	-1.10
	Intermediaries	66	18	0.06	41	43	1.35	79	8	-0.36	78	6	-1.16
	Trade Unions	27	11	0.93	18	20	0.35	37	4	0.36	38	0	-1.83
	Community	11	6	0.48	13	4	-1.86	19	1	-0.01	15	2	0.28
Clients (Level)	Low Level	34	13	1.05	25	22	-0.25	46	4	-0.24	44	3	-0.77
	High Level	30	8	-0.47	15	23	1.31	38	3	-0.23	36	2	-0.81
	Mid Level	21	6	-0.42	12	15	0.27	28	2	-0.08	26	1	-0.75
Totals / R^2		1191	347	R^2 = 0.87	799	739	R^2 = 0.94	157	147	R^2 = 0.78	159	148	R^2 = 0.70

Notes: "Standardized Residuals" are the difference between expected and actual values divided by the standard deviation of differences.
Items two or more standard deviations from the expected value are highlighted in red (p<0.05) and those further than 1.5 standard deviation from the expected value are highlighted in yellow (p<0.14).

Table A4: Within-subsample analysis of major organizations in grey literature

Category	Item	ETF			Cedefop			OECD		
		Grey -ETF	ETF	Standard Residual	Grey - Cedefop	Cedefop	Standard Residual	Grey - OECD	OECD	Standard Residual
Content	Strategy	48	15	0.79	58	5	-0.54	54	9	-1.45
	Accountability	39	10	-0.55	43	6	1.16	39	10	-0.37
	Piloting	24	5	-1.24	26	3	-0.19	24	5	-0.49
	Slow Pace	17	7	0.44	22	2	-0.74	20	4	-0.46
	Bottom-Up	16	4	-0.84	17	3	0.35	19	1	-1.00
	Incremental	12	4	-0.41	14	2	-0.26	10	6	0.53
Context	Coordination	37	12	0.59	44	5	0.31	39	10	-0.37
	Context Fit	35	10	-0.12	38	7	2.25	43	2	-2.21
	Decentralize	18	9	1.25	24	3	-0.07	26	1	-1.41
	Formalism	23	12	2.10	30	5	1.15	27	8	-0.07
	Strong Econ	9	1	-1.47	8	2	0.10	10	0	-0.67
	Ed Quality	3	0	-1.29	2	1	-0.33	3	0	-0.27
Commitment	Political Will	37	11	0.13	41	7	2.07	44	4	-1.86
	Cooperation	41	11	-0.31	47	5	0.13	43	9	-0.80
	Foreign Aid	30	13	1.81	38	5	0.67	39	4	-1.57
	Ownership	14	6	0.30	16	4	1.20	19	1	-1.00
	Low Turnover	7	5	0.59	10	2	-0.02	12	0	-0.79
Capacity	Personnel	46	15	1.00	56	5	-0.41	53	8	-1.59
	Finances	43	14	0.86	53	4	-1.03	48	9	-1.09
	Research	50	13	-0.35	56	7	1.17	48	15	0.11
	Time	17	2	-1.87	16	3	0.41	18	1	-0.94
	Leadership	13	6	0.41	18	1	-1.29	17	2	-0.68
Clients (Type)	Employers	68	15	-1.37	78	5	-1.74	55	28	2.30
	Educators	47	12	-0.49	53	6	0.56	47	12	-0.43
	Intermediaries	58	15	-0.29	67	6	-0.29	49	24	1.85
	Trade Unions	27	5	-1.57	30	2	-1.23	20	12	1.15
	Community	10	6	0.73	16	0	-1.97	15	1	-0.77
Clients (Level)	Low Level	27	10	0.74	33	4	0.18	34	3	-1.48
	High Level	21	7	0.00	25	3	-0.13	22	6	-0.17
	Mid Level	17	7	0.44	22	2	-0.74	20	4	-0.46
Totals / R^2		854	262	R^2 = 0.84	1001	115	R^2 = 0.63	917	199	R^2 = 0.45

Notes: "Standardized Residuals" are the difference between expected and actual values divided by the standard deviation of differences.
Items two or more standard deviations from the expected value are highlighted in red ($p<0.05$) and those further than 1.5 standard deviation from the expected value are highlighted in yellow ($p<0.14$).

Table A5: Within-subsample analysis of developed and developing countries in Europe

Category	Item	Europe		
		Developed	Developing	Standard Residual
Content	Strategy	19	27	1.61
	Accountability	17	13	-0.65
	Piloting	12	14	0.26
	Slow Pace	14	9	-0.94
	Bottom-Up	7	8	-0.10
	Incremental	7	4	-0.83
Context	Coordination	13	20	1.21
	Context Fit	14	13	-0.21
	Decentralize	7	9	0.08
	Formalism	10	13	0.37
	Strong Econ	2	7	0.44
	Ed Quality	1	0	-0.69
Commitment	Political Will	17	15	-0.29
	Cooperation	15	15	0.00
	Foreign Aid	13	18	0.84
	Ownership	10	6	-0.91
	Low Turnover	1	6	0.41
Capacity	Personnel	17	21	0.81
	Finances	19	20	0.33
	Research	24	20	-0.40
	Time	15	6	-1.64
	Leadership	4	6	-0.03
Clients (Type)	Employers	26	23	-0.14
	Educators	19	16	-0.40
	Intermediaries	22	21	0.08
	Trade Unions	8	12	0.48
	Community	1	3	-0.14
Clients (Level)	Low Level	8	14	0.85
	High Level	12	11	-0.29
	Mid Level	7	8	-0.10
Totals / R^2		361	378	$R^2 = 0.68$

Notes: "Standardized Residuals" are the difference between expected and actual values divided by the standard deviation of differences. Items two or more standard deviations from the expected value are highlighted in red ($p<0.05$) and those further than 1.5 standard deviation from the expected value are highlighted in yellow ($p<0.14$).