

Chapter 1

Where Are We on Theorizing Teaching? A Literature Overview



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Abstract This chapter begins by outlining the key ideas and problems of the theorizing of teaching as discussed in selected English-language literature published over the past six decades. The focus is on the value of theories of teaching and the ways theories of teaching and related terms have been defined. After creating a synthesis of the various attributes which researchers have suggested can be used for assessing the quality of theories of teaching, we discuss the process and difficulties of generating theories, and present a summary of theories of teaching found in the literature. The second part of this chapter clarifies the aims of this book, describes the sampling criteria for the selection of contributors, provides an overview of the structure of the book, and lists the questions that the contributors were asked to address.

Keywords Theorizing teaching · Theory attributes · Theory definition · Theory generation · Theories of teaching

1 Introduction

Because teaching serves a vital function for societies, conveying knowledge and competences as well as cultural norms and values, researchers have been trying to identify the characteristics of high quality teaching for decades. Over this same period, there have been ongoing academic debates about whether there are theories of teaching and the extent to which the research into teaching quality needs to be approached from a theoretical perspective. Hyman in 1971 argued that although

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there is no “complete agreement about what a theory of teaching is or should be, educational writers all agree there is a need for it” (cited after Newsome, 1992). Some academics (e.g., Klauer, 1985; Openshaw & Clarke, 1970; Philips, 2003) assert that there are numerous theories of teaching, but there are others who have suggested that there have been few advances in the development of a theory of teaching (e.g., Berliner, 2009; Hill & Schrum, 2002; Rosenshine, 2009) and claimed theory of teaching is “a stepchild” of theoretical work on teaching and learning (Gage, 2009, p. 1).

This divergence of opinion might be because, although there have been multiple attempts to conceptualize teaching (e.g., Berliner, 2005; Fenstermacher & Richardson, 2005; Gage, 2009; Lampert, 2001), the field does not seem to have reached a consensus on what constitutes a theory of teaching and what such a theory should encompass. This is also evident in the way the distinction between the term *theory* and other related terms remains unclear (Praetorius et al., 2020), with theory being used interchangeably with more narrowly defined terms such as conception, framework, and model.

For this book we asked distinguished academics working on the theorizing of teaching to reflect on the existence, definition, and attributes of theories of teaching. The resulting chapters deliver an up-to-date overview of theorizing teaching which is important for future work on teaching and teaching quality. In order to provide a context for the rest of the book, this chapter defines terms and provides a general literature review of the subject.

We first describe how we selected the publications on which this chapter is based before discussing the importance of theories of teaching and exploring the various definitions of a theory and other related terms. We then synthesize a list of the attributes which researchers have suggested determine the quality of theories of teaching and discuss the process and inherent difficulties of generating such theories. Next, we review theories of teaching in the literature after which we discuss what we hoped to achieve by producing this book, outline the sampling criteria that informed the selection of authors, provide an overview of the structure of the book, and conclude by presenting the questions that guided the writing of the chapters to follow.

2 Identifying Publications on Theories of Teaching

To ensure that our review of theories of teaching was based on a sufficiently broad sample of the literature we used a three-pronged approach.

First, we screened the titles of all of the chapters in the five existing editions of the *Handbook of research on teaching* (1963, 1973, 1986, 2001, 2016) on the grounds that each edition would reveal the important issues in teaching at the time of publication. We sampled all chapters that included the term theory or a related term (conception, framework, model, paradigm) in the title. We also reviewed the titles of the rest of the chapters and, based on a consensual decision, included those we thought might be relevant (e.g., chapters synthesizing existing research on teaching were included

as they referred to theory-related issues). We selected 15 chapters in total: one from 1963, two from 1973, four from 1986, six from 2001, and two from 2016.

Second, we conducted a literature search in the fall of 2019. As we were mostly interested in internationally recognized work where theories of teaching are the focus of the publication, we (a) limited our search to publications in which the terms listed below appear in the title, (b) used the education-focused Scopus database in Social Sciences and Psychology, and (c) focused on English-language publications. We used the search terms “theory of teaching” OR “theories of teaching” OR “teaching theory” OR “teaching theories”. We initially identified 92 publications. Except for two publications that were not available on the literature databases to which we had access, 44 publications were excluded because a title-abstract screening revealed that their focus was on issues that differed from the ones in which we were interested (e.g., practical or teaching theories of teachers). Another 33 publications were excluded after an initial full-text screening because the term theory was either not defined or not explained in them. As a result, 13 publications were identified as suitable for a further full-text screening.

Third, we used the snowballing technique (i.e., reference list checking) to complement our literature search. Based on that, we added two books relevant to our topic (Schoenfeld, 2011; Gage, 2009) and one journal publication (Bikner-Ahsbahs & Prediger, 2010). In total, 31 publications have been used as the basis for this review (these are marked with an asterisk in the reference list).

We acknowledge that our selection criteria, especially the requirement that theories be explicitly mentioned, resulted in the exclusion of some work that directly focuses on unpacking teaching practice (e.g., Cohen, 2011; Lampert, 2001). For example, despite it providing a detailed account of the work of teaching, Lampert’s *Teaching Problems and the Problems of Teaching* was not included because Lampert refers to her work as an elaborated model of teaching practice (see Chap. 14). We felt the restriction was necessary in order to have a manageable number of publications to process for this chapter.

3 The Importance of Theories of Teaching

Theories play a central role in all scientific research. Justifying their importance for research, Colquitt and Zapata-Phelan (2007) summarized scholarly opinion on the issue and concluded that theories allow for the *understanding* and *prediction* of outcomes of interest, *describe* and *explain* a process or sequence of events, *raise consciousness* about a specific set of concepts and *prevent* scholars from “being dazzled by the complexity of the empirical world by providing a linguistic tool for organizing it” (p. 1281). Hill and Smith (2005) expand on this by pointing out that a “good theory helps identify what factors should be studied and how and why they are related” (p. 2).

Scholars have argued that theories are important (Biddle & Anderson, 1986; Floden, 2001) because they are both the means for and an end goal of research on teaching (Bikner-Ahsbahs & Prediger, 2010; Gage, 1963a). They help us to better

understand teaching (i.e., the goal) and serve as tools that facilitate research (i.e., the means). It has also been said that theories make the assumptions we have about teaching explicit, define the goals of our research, help us to discover, select, sharpen, and modify situations, research objectives and variables and any related research questions, bring order to variables, support selection methods, and synthesize, explain, and interpret the resulting data; theories of teaching may also enable researchers to predict future outcomes and contribute to making research more cumulative (Biddle & Anderson, 1986; Bikner-Ahsbabs & Prediger, 2010; Snow, 1973). Biddle and Anderson (1986) further suggested that a theory be a prerequisite for developing any policy recommendations.

Several publications discuss the relation between theories of teaching and theories of learning. Gage (1963a, b) noted the relative scarcity of theories of teaching compared to theories of learning and summarized the view of some scholars as follows:

[I]f we have an adequate theory of learning, then the teacher must of necessity act upon that theory, without employing any separate theory of teaching. The teacher, if [s]he is to engender learning, must of necessity do what the theory of learning stipulates as necessary for learning to occur. Teaching must thus be a kind of ‘mirror image’ of learning. (p. 133)

Gage (1963a, b) himself did not support this line of thinking and instead used the analogy of a farmer to make a case for having theories of both teaching and learning: Farmers need to not only know how plants grow (theories of learning) but also how to farm (theories of teaching). Snow (1973) argued that the principle of parsimony dictated that theories of teaching need to build on theories of learning, although they have to be more complex (for a similar argument, see also Openshaw & Clarke, 1970). Fenstermacher (1986) reasoned that teaching and learning are not causally related since teaching can exist without learning.

It is thus clear that researchers in education agree on the importance of having theories in general and that many also recognize the particular value of having theories of teaching. Earlier editions of the *Handbook of research on teaching* (1960s to 1980s) discussed the need for theories of teaching more often than later ones, but the reason for the reduced emphasis in more recent editions is not clear. Do education researchers now feel that there is a consensus on the importance of theories on teaching and the degree to which such theories exist? This question will be explored in this book.

4 Theory: Definition and Related Concepts

Although theories play a pivotal role in scientific research, there is no single definition of what comprises a theory. In the field of teaching, Snow (1973) remarked that there “appear to be almost as many definitions of theory as there are people concerned with theory” (p. 78). Of the 31 publications reviewed for this chapter, only seven included explicit definitions of the term theory. These definitions are outlined in Table 1.1.

Table 1.1 Definitions of theories in sources reviewed

Biddle & Anderson (1986)	<p>“By scientific theory we mean the system of concepts and propositions that is used to represent, think about, and predict observable events. Within a mature science that theory is also explanatory and formalized. It does not represent ultimate “truth;” however; indeed, it will be superseded by other theories presently. Instead, it represents the best explanation we have, at present, for those events we have so far observed.” (p. 241)</p>
Bikner-Ahsbahs & Prediger (2010)	<p>“[T]heories’ are constructions in a state of flux. They are more or less consistent systems of concepts and relationships, based on assumptions and norms. They consist of a core, of empirical components, and their application area. The core includes basic foundations, assumptions and norms which are taken for granted. The empirical components comprise additional concepts and relationships with paradigmatic examples; it determines the empirical content and usefulness through applicability.” (p. 488)</p> <p>They also distinguished between two different understandings of theory, a static and a dynamic one. The static perspective focuses on “theory as a human construction to present, organize and systematize a set of results about a piece of the real world, which then becomes a tool to be used” (p. 485) whereas the dynamic one understands “theory as a tool in use rooted in some kind of philosophical background which has to be developed in a suitable way in order to answer a specific question about an object” (p. 485), thus emphasizing that theories are always under development</p>
Gage (1963a, b)	<p>“[W]e use the term <i>theory</i> in a modest sense to refer to any systematic ordering of ideas about phenomena of a field of inquiry.” (p. 102)</p> <p>“Theories of teaching would make explicit how teachers behave, why they behave as they do, and with what effects.” (p. 133)</p>
Openshaw & Clarke (1970)	<p>“A theory must define and delimit and make statements of relationship among variables.” (p. 411)</p> <p>“Teaching theory must state relationships among the sets of variables involved so that (a) teacher behaviors that will achieve curricular objectives are specified, (b) teacher behaviors that will fail to achieve curricular objectives are specified, (c) teacher behaviors that will achieve other (unwanted) behaviors are specified.” (p. 408)</p> <p>They also refer to Kerlinger’s definition of theory (1964, p. 11): “A theory is a set of interrelated constructs (concepts), definitions and propositions which presents a systematic view of phenomena by specifying relations among variables, with the purpose of explaining and predicting phenomena”</p> <p>Moreover they use Smith’s definition of theory of teaching: “A theory of teaching will consist of: (a) a statement of variables comprising teacher behaviour, (b) a formulation of the possible relations among these variables, and (c) hypotheses about the relations between the variables comprising teaching behaviour and the variables descriptive of the psychological and social conditions within which the teaching behaviour occurs.”</p>
Schoenfeld (2011)	<p>“A framework tells you what to look at and what its impact might be. A theory tells you how things fit together. It says how and why things work the way they do, and it allows for explanations and even predictions of behaviour.” (p. 4)</p>
Snow (1973)	<p>“A theory is a symbolic construction designed to bring generalizable facts (or laws) into systematic connection. It consists of a) a set of units (facts, concepts, variables) and b) a system of relationships among the units. These are defined and interpreted in statements that are understandable to others and make predictions about empirical events.” (p. 78)</p>
Sztajn et al. (2012)	<p>The authors are following Schoenfeld’s (Schoenfeld 2011) definition: “Theory brings the pieces together into an explanatory framework that allows for justifications and predictions.” (p. 152)</p>

The definitions all refer to a set of units (variously termed ideas, facts, concepts, variables, constructs, definitions, and propositions) and a system of how they are related. Some also explain that theories are based on assumptions and norms and that they can either be more stable or more dynamic. A few of the definitions include not only the components of the theories, but also the functions of those components such as that they can be used to describe, explain, and predict certain events, and that they should allow for the making of generalizations.

A survey of the handbook chapters and journal articles revealed that other terms are sometimes used interchangeably with theory. *Model* is one such often used equivalent. According to Snow (1973), theory and model “may be regarded as synonymous when used to label theoretical constructions expressed in formal postulational style” (p. 81). Oser and Baeriswyl (2001) characterize teaching models as “showpieces in educational theory” (p. 1039), while others evaluate models using criteria such as “theoretical beauty” (Nuthall & Snook, 1973, p. 48), and Shulman (1986) calls a model by Dunkin and Biddle a “theoretical matrix”. Framework and conception are also used in this way in other publications we reviewed. For example, Sztajn et al. (2012), describe their theory as a theoretical framework (see also Klauer, 1985) and Ericson and Ellett (1987) use conception and theory as equivalent in several places.

Attempting to bring some clarity to the boundaries between these terms, we resorted to definitions provided by the Oxford English Dictionary (see Table 1.2).

We have ordered the terms hierarchically in the table, from simplest to most complex. We start with *conception* which has the fewest requirements in terms of structure and connections between ideas; it simply refers to an idea or view of something. We then move to *framework*, which unlike *conception*, implies a structure in which ideas are organized. In addition to having a structure, we define *model* as also including relations between ideas, which are key to supporting predictions. Similar to *model*, *theory* also includes the structures and relations among ideas, but the latter term is broader, since theories represent a system of ideas and underlying principles; models, by contrast, provide a simplified description of the ideas of interest and their interrelations. The term *theory* therefore has more presuppositions than the other terms. Thus, we can say that frameworks can evolve into models by including relations among constructs of interest; similarly, models can mature into theories (Leplin, 1980) by fulfilling certain criteria reflecting general underlying principles (see also Praetorius et al., 2020).

Table 1.2 Definitions of theory and related terms according to the Oxford English Dictionary

Term	Definition
Conception	An abstract idea, a concept The way in which something is perceived or regarded
Framework	A basic structure underlying a system, concept, or text
Model	A simplified description [...] of a system or process, to assist [...] predictions
Theory	A supposition or a system of ideas intended to explain something, especially one based on general principles independent of the thing to be explained

Applying this to research on teaching quality, one could argue that a compilation of aspects of teaching represents a conception of teaching quality. If these aspects are organized into categories (often called dimensions or domains, cf. Praetorius & Charalambous, 2018), then they can be considered to form a framework. Linking these categories to specific student learning activities and outcomes results in a model. If this model also fulfils a set of criteria (e.g., being based on logical, theoretically related and internally consistent statements that are empirically testable, while also sketching the boundaries of the applicability of these statements; see more in Praetorius et al., 2020), it can be considered a theory.

In summary, the sources we have reviewed provide no generally agreed definition of the term theory for the field of teaching. The existing definitions do have one area of overlap, however, in that they all refer to the systematic organization of different concepts. It is also evident that it is difficult to distinguish the term theory from other similar terms such as conception, framework, and model. Dictionary definitions of these terms (e.g., from the Oxford English Dictionary) can help, but it is unclear whether the boundaries between the definitions of the terms are sufficiently obvious or if scholars in the field of research on teaching would agree to make such distinctions.

5 Attributes of a Theory of Teaching

Although the definitions provided above also include attributes of theories, some authors in addition explicitly discuss specific attributes that can be used to evaluate the quality of a theory. Table 1.3 presents three lists of such attributes identified in our literature search. These lists were published between 1968 and 1980 and include between 10 and 14 attributes. Six of them are mentioned in all three lists, so it can be assumed that their importance is generally agreed. These attributes state that theories should consist of: (a) clearly defined terms and a set of postulates, (b) explicit boundaries, (c) internally consistent statements, while also being (d) consistent with empirical data, (e) capable of generating hypotheses, and (f) testable. Four attributes are shared by two of the three lists and might therefore be assumed to be at least partly accepted by the research community. According to these attributes, theories should (g) have predictive value, (h) be parsimonious, (i) include quantitative relations and (j) include qualitative relations.

There does not seem to be much consensus on the inclusion of some of the attributes as they were each only mentioned in one of the three lists: Theories need (k) to generalize beyond data as well as require (l) vigilance; to avoid (m) unnecessary symbolization, (n) unnecessary formalization, (o) oversimplification; to include (p) theoretically related statements, (q) a hierarchical or systematic order of statements, (r) higher level constructs integrate lower level constructs; and contain or clearly imply (s) prescriptive statements.

Not only can these attributes be very useful for evaluating the quality of a theory, but they can also be used when generating a theory. We need to consider, however,

Table 1.3 Lists of attributes of theories of teaching

Openshaw & Clarke (1970)	Snow (1973)	Kane & Marsh (1980)
A statement of instructional theory should include a set of postulates and definition of terms involved in these postulates	The statement of a theory should make explicit its postulates (axioms and theorems) and the definitions of terms involved in these postulates	Logical statements (axioms, corollaries, postulates) Clearly defined statements
The statement of an instructional theory or subtheory should make explicit the boundaries of its concern and the limitations under which it is proposed	The statement of a theory should make explicit the boundaries of its concern and the limitations under which it is proposed	The boundaries or limitations of concern of the theory should be stated, including such limitations as theories of learning and development subscribed to, philosophies adhered to, characteristics of the students and organizations deemed suitable. The most general theory will have as few such limitations as possible
A theoretical construction must have internal consistency – a logical set of relationships	A theory should have internal consistency as a logical system	Internally consistent statements
An instructional theory should be congruent with empirical data	A theory should be consistent with existing empirical data	The statements should have demonstrable empirical support However, at the present time it may be necessary to include as yet untested hypotheses to meet the completeness criteria
An instructional theory must be capable of generating hypotheses	A theory should be capable of generating specific hypotheses and predictions	Capable of being easily and clearly restated in the form of hypotheses
An instructional theory must be verifiable An instructional theory must be stated in such a way that it is possible to collect data to disprove it	A theory should be testable	Testability Hypotheses about which evidence can be collected to either verify or refute them
An instructional theory must not only explain past events but must also be capable of predicting future events		Statements should have predictive value in similar situations
At the present time, instructional theories may be expected to represent qualitative synthesis		Qualitatively related statements

(continued)

Table 1.3 (continued)

	A theory should be parsimonious	These statements should be as few as possible to cover all of the theories and findings relevant to the area specified
	A theory should be quantifiable	If possible, these statements should be quantitatively related
An instructional theory must contain generalizations which go beyond the data		
	Unnecessary symbolization should be avoided	
	Unnecessary formalization should be avoided	
	Oversimplification should be avoided	
	Theorizing by means of models requires vigilance	
		Theoretically related statements
		Hierarchical or systematic order of the statements
		The higher level constructs integrate the constructs below
		To be of practical use, a theory of instruction should contain or clearly imply a series of prescriptive statements, specifying how best to obtain given ends, if they are desired. Areas to be covered include strategies, sequencing, materials, reinforcements, motivation

whether these attributes could be more broadly accepted, given that they are based on a particular understanding of science (see Praetorius et al., 2020). It would also be useful to consider whether the attributes found on all three lists resemble those highlighted by scholars working on teaching nowadays.

6 The Process of and Difficulties in Generating Theories of Teaching

Interestingly, researchers often emphasize that the theory they are writing about is not yet fully developed, characterizing their work as being a step “toward a theory of teaching” (e.g., Durka, 1979; Gage 1963a, b; Langer & Applebee, 1986; Shuell, 1993; Stone, 2013 Sztajn et al., 2012; Zimmerman & Kleefeld, 1977). At the same time, the issues and challenges posed by the development of theories of teaching are

not much discussed in the literature on teaching. The most detailed discussion we are aware of can be found in Snow (1973). Snow stated that metaphors (i.e., “basic heuristics for theoretical speculation in science”, p. 81) and models (i.e., “projection of a possible system of relationships among phenomena, realized in verbal, material, graphic or symbolic terms”, p. 81) are precursors to theory building, and that metaphors can be developed into models by codifying them into symbolic or representational form. Snow also highlighted the pivotal role played by metatheories in theory development (i.e., “a theory concerned with the development, investigation or description of theory itself”, p. 79, “a kind of syntax or grammatical structure within which a particular theory can be developed and stated”, p. 80).

Snow (1973) went on to describe the processes involved in developing theories. These are:

- (a) Analyzing (i.e., defining the units to be used)
- (b) Translating (i.e., adapting theories from one domain to serve another domain)
- (c) Schematizing (i.e., using figures/representations to denote ideas/relations)
- (d) Miniaturizing (i.e., working on a portion of the domain instead of trying to capture the entire domain)
- (e) Taxonomizing (e.g., through taxonomies of learning outcomes; taxonomies of types of teaching activities; components of the learning process; and families of learning theories)

He further argued that miniaturizing could be used as the starting point for developing more general theories but noted that approaches such as miniaturizing have been infrequently used in the past. In a similar vein, he also mentioned the possibility of starting with existing theories of learning and adding propositions for describing and prescribing teaching, leading to what he called minimum theories (for such approaches, see Sect. 7). Snow went on to argue for the importance of explicitly taking into account different levels of theories, ordered alphabetically from the most (A) to the least developed (F). According to his suggestion, D(escriptive)-, E(lementisms)-, and F(ormative hypotheses)-Theories mainly consist of summarizing empirical relations; B(roken axiomatic)- and C(onceptual)-Theories focus on a back and forth between theoretical considerations and empirical data, whereas A(xiomatic)-Theories are the most formal and logically structured theories and include a research agenda to test the hypotheses based on theoretical ideas. According to Snow, A-Theories do not exist in Education and Psychology, therefore B-Theories are the highest level that might be achieved in the near future, including, for example, theories that have been proven to be insufficient but still useful.

Biddle and Anderson (1986) also discussed the process of developing theories of teaching, focusing on the close dependency between theories and events. Whereas Snow (1973) pointed to different processes involved in generating theories, Biddle and Anderson (1986) placed more emphasis on the fundamental building blocks of theories and how these get transformed in the process of generating theories. They suggested that the starting point for developing theories are concrete events. Based on the formal observations of these events, theories are developed, involving the creation of (a) elements, (b) postulates, (c) conceptual definitions, (d) empirical

findings, and (e) empirical hypotheses (defined as “new, derived statements about relations among conceptual definitions” (p. 241). These theories are then applied to new events, through experimentation involving prediction and agreed-upon methods (operations). Theories might then be revised on the basis of these new observations.

Some publications describe the challenges posed by developing and applying theories. Biddle and Anderson (1986), for example, noted that theories of teaching need to be highly complex:

Teaching consists of a set of observable practices that have causes and effects that can be measured. Complexity is generated because these practices, causes, and effects are multifaceted, contextually bound, and difficult to conceptualize and study effectively. To gain understanding of these phenomena is the central purpose of research on teaching, but it is unreasonable to believe that our understanding will often be expressed as simple, universally applicable propositions. Instead, if teaching is complex, then our theories concerning it must be complex also. (p. 244–245)

In light of Sect. 4, this accords with the attribute of “avoiding oversimplification” (Snow, 1973), but also implies that the attribute of parsimony, suggested by Snow (1973) and Kane and Marsh (1980), may not be easily applicable.

Bikner-Ashbahr and Prediger (2010) identified two ways in which theories can develop. Empirically grounded theories “develop in a spiral process of empirical analysis and theory construction” (p. 500) and prescriptive theories develop by “argumentative connections to other theory elements and by a successive process of making explicit the philosophical base” (p. 501). Within each system, aspects of theories can also develop in different directions: explicitness (i.e., implicit suppositions and the underlying philosophical basis becoming more explicit in mature theories), empirical scope (i.e., developing from local and contextualized theories to formal theories), stability (i.e., increasing the stability of theories by increasing its applications), and connectivity (i.e., linking theories).

In conclusion, our review of the selected literature from the past six decades reveals that, while there have been some suggestions for how best to develop theories of teaching, not much effort has been expended on actually generating theories. The necessary complexity of any theory of teaching as well as how research can be cumulative across multiple theories is perhaps the biggest of the many challenges faced by researchers.

7 The (Non-)Existence of Theories of Teaching

7.1 *Theory References in the Handbook Chapters*

In some of the handbook chapters we reviewed it was argued that theories of teaching had not been the focus of research at the time they were written – it was even stated that such theories did not exist. Gage (1963a, b), for example, mentioned that theories of teaching had rarely been discussed until then and concluded that such a theory “almost may be said not even to exist thus far” (p. 133). Nuthall and Snook

(1973) concluded that “the guiding force of much of the research on teaching has not been the gradual refinement of seminal models and larger theoretical structures” (p. 48), while Snow (1973) did not mention theories directly but did highlight the existence of models. Years later, Floden (2001) bluntly, and rather pessimistically, commented: “A theory of teaching is a worthy goal; it is unlikely to be attained in the near future” (p. 14).

In other handbook chapters, there was an underlying assumption that theories existed without much evidence for them presented. For instance, Fenstermacher (1986) mentioned the existence of normative theories of teaching, without listing any concrete examples and referring only to an overview in a handbook chapter by Greene (1986). Fenstermacher (1986) defined normative theories of teaching as employing “philosophical inquiry and wisdom to stipulate what is in the educative interest of the learner and how, in general, teachers might act to insure the learner’s education” (p. 46).

Biddle and Anderson (1986) identified two different types of theories. According to them, some theories use common language explanations for events (type 1): “theory at this level provides us with a tentative ‘understanding’ for why things work the way they do and implies actions that we might take if we are to achieve specific effects”. They refer to Good’s (1982) thoughts about why a certain treatment program was effective (e.g., emphasizing the meaning of mathematical concepts) as an example of this type of theory. According to Biddle and Anderson, few theories of teaching are formally stated with propositions and definitions for the terms used (type 2). They used Nuthall (n.d.) as an example, in which he stated reasons why students should learn during question and answer cycles in the classroom (e.g., “All pupils in a class respond covertly to each question which a teacher asks during class discussion, unless the question fails to motivate the covert response process”, p. 13).

Oser and Baeriswyl (2001) referred to the Elaboration Theory formulated by Reigeluth and Stein (1983) as an example of a theory of teaching. This is a prescriptive theory from the area of instructional design. According to Oser and Baeriswyl, it focuses on the description of methods of instruction. It includes seven methods (Reigeluth & Stein, 1983, p. 345): (a) a simple-to-complex sequence (for the main structure of the course), (b) learning-prerequisite sequences (within individual lessons of the course), (c) summarizers, (d) synthesizers, (e) analogies, (f) cognitive-strategy activators, and (g) learner-control formats. For each of the methods, the expected result is described [e.g., for (a) the formation of more stable cognitive structures, causing better long-term retention and transfer] along with related hypotheses [e.g., for (a) the sequence is based on epitomizing instead of summarizing to make learning more meaningful and less rote]. Oser and Baeriswyl further argued that a theory of teaching cannot be equated with a theory of learning, but that some approaches such as Aebli’s didactical model aim to bring both together.

Unfortunately, there appears to be no consensus on whether theories of teaching exist. Some of the authors of the handbook chapters doubted the existence of genuine theories of teaching. Those who did write about them, listed as theories ideas which could be described as dynamic compared to the static understanding of theory; yet, these ideas mostly do not accord with the attributes for theories listed in Sect. 4.

7.2 Theory References in Journal Articles

Some of the journal articles reviewed contained references to a theory, but did not go into much detail. Sztajn et al. (2012), for example, essentially presented their learning trajectory based instruction theory by referring to the components it included (e.g., task demand, specialized content knowledge, and monitor), but did not give any consideration to the way the components fit into a structure.

Only two papers included detailed discussions of theories of teaching. The first is by Klauer (1985). He stressed that an “all-encompassing theory of teaching can be conceived only as a hierarchy of interrelated theories” (p. 5). Presenting an initial hierarchy (and mentioning that further work is needed for a complete understanding of the system), he distinguished six higher-order subtheories based on a 2 × 3 matrix, referring to the type of study (descriptive, prescriptive, and normative) and the type of question to be answered (what to teach, how to teach) (see Fig. 1.1).

Klauer then provided a detailed description of one of these subtheories (i.e., prescriptive, how to teach), based on information processing models. He identified six teaching functions (“should functions”) that are necessary and sufficient for learning to occur. These are (a) motivation, (b) information, (c) information processing, (d) storing and retrieving, (e) transfer of information, and (f) monitoring and directing. He turned his idea into a teaching algorithm (see Fig. 1.2). His approach, coming up with teaching functions, was based on analyzing (a) the learning objectives, (b) the student processes necessary for achieving these objectives, and (c) the processes associated with different aspects of teaching that align teaching and learning. Klauer’s theory is therefore another example of the close relation between theories of learning and theories of teaching and how the former can inform the latter.

		Type of Study			
		Descriptive	Prescriptive	Normative	
Type of Question	What?	A Objectives/ subject matter in classrooms	B Curriculum	C Ultimate ends	Theory of teaching objectives
	How?	D Teacher- student interactions	E Teaching methods	F Professional ethical standards	Theory of teaching methods
		Educational psychology (Teaching research)	Educational technology or science of teaching design	Philosophy of education	

Fig. 1.1 Higher-order subtheories of teaching as categorized by Klauer (1985, p. 7). Reprinted with permission

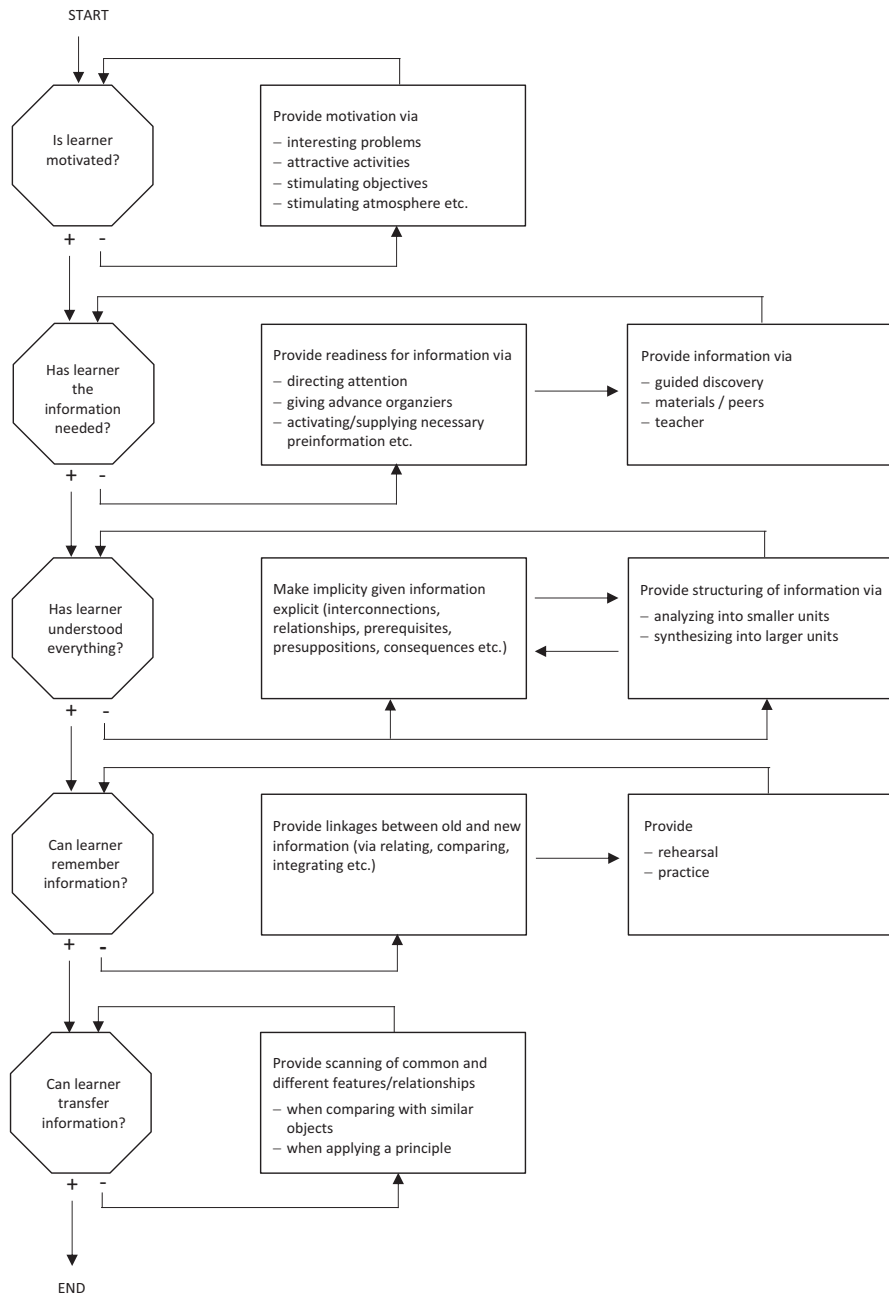


Fig. 1.2 Teaching algorithm proposed by Klauer (1985, p. 12). Reprinted with permission

Openshaw's and Clarke's (1970) paper is the second example of complex thinking about theories of teaching. The authors stated that having a learning theory is a necessary but not sufficient condition for developing a teaching theory and that theories of teaching can only be normative (see also Table 1.1). They distinguished three levels of teaching actions. Prescriptive statements were presented for each level (see examples below), which then had descriptive corollaries (what happens when) that enabled the generation of predictions about teaching (p. 409):

- Level 1: Teaching activities that set the stage for learning and are thus necessary conditions for teaching (e.g., develop teacher-student interpersonal relationships conducive to student learning)
- Level 2: Teaching activities that are at the core of learning and therefore are necessary and sufficient conditions for teaching (e.g., employ strategies that produce minimal interference with other objectives and that are appropriate to (a) the characteristics of the learner, (b) how students learn, and (c) the specific curricular objectives)
- Level 3: Teaching activities that appraise the process and the product and are described as necessary for the efficiency of teaching (e.g., appraise student progress toward curricular objectives with a view to reteaching, revising teaching strategies, revising curricular objectives, or a combination of these)

Like Klauer (1985), Openshaw and Clarke (1970) developed their theory around student learning. They specified, among others, the following relations among the different levels: (a) Level 1 outcomes are the basis for Level 2, (b) feedback from Level 3 supports the efficiency of Levels 1 and 2, and (c) efficiency is also increased if more Level 1 outcomes are indirectly realized through Level 2 activities.

We can conclude that although some authors claimed that no theories of teaching existed, others proposed them. The theories of teaching proposed varied considerably in their focus and sophistication as well as in the degree to and the manner in which their approaches were justified. Some of them had a static understanding of theories, others a dynamic one. Authors described their theories as descriptive, prescriptive, or normative. A few publications considered the relation between theories of teaching and learning. Others expanded these ideas, stating that theories of teaching needed to be more complex than theories of learning since learning must be a part of any theory of teaching (Gage 1963a, b; Snow, 1973). Some authors, however, argued that teaching cannot necessarily be seen as the cause of learning since students are responsible for their own learning (Biesta & Stengel, 2016).

Most of the selected literature on theories was written by scholars in the fields of educational science, educational psychology, philosophy of education, and research on teaching within disciplines. The literature is very broadly formulated and does not focus on specific subjects or student populations. Recently, however, there is an increased interest in how different student populations respond to teaching (e.g., Kennedy, 2010) and researchers are more systematically paying attention to differences in what counts as high-quality teaching in different subjects (e.g., Fogo, 2014; Kyriakides et al., 2018; Praetorius et al., 2020).

7.3 *Dealing with the Existing Diversity*

The theorizing of teaching is a very diverse subject. Not only do academics not agree on whether theories of teaching exist, but when they do believe that there are theories, they identify a variety of theories and assign different definitions and attributes to those theories, all with varying degrees of explicitness and sophistication.

The diversity need not be problematic. Bikner-Ahsbabs and Prediger (2010) state that one should consider “the diversity of theoretical approaches as a resource for grasping complexity that is scientifically necessary” (p. 489) while emphasizing that accepting “that the diversity of theories is a resource for scientific progress does not mean accepting the co-existence of isolated, arbitrary theoretical approaches which ignore others” (p. 489). This can lead to outsiders perceiving the research community as incoherent. It can also increase the likelihood of miscommunication, result in no integration of empirical results, and a consequent lack of scientific progress in the community. The authors therefore highlight that “[p]lurality can only become fruitful, when different approaches and traditions *come into interaction*” (p. 490), establishing a “culture of constructive debate”, including the discussion of theory development, specific theories and their strengths and weaknesses, and metatheoretical and methodological issues. They identify different degrees of theory integration (see Fig. 1.3) with the aim of discussing the extent to which theories can be integrated to allow for better communication and understanding, better alignment of research results, and enhancing the coherence within a community, limiting the exponential inflation of the number of theories, and creating a more comprehensive network of theories to improve teaching and learning.

Bikner-Ahsbabs and Prediger (2010) consider *understanding the theories of others* and *making your own theory understandable* the fundamental steps in any inter-theory communication. The authors identify *contrasting* and *comparing* as the strategies most often used to find connections between theories. Contrasting is mainly about extracting big, distinctive differences between theories while comparing is about general similarities and differences. *Coordinating* and *combining* focuses on a deeper insight into empirical phenomena. Combining is possible with any selection of theories, even if the theories being combined have conflicting basic assumptions, but coordinating only works with theories which are highly compatible. *Synthesizing* and *integrating locally* is about working to form theories into one larger theory. Synthesizing means the connection of equally stable theories into a new theory. Integrating locally is applied if one of the theories is more complex and only selected aspects of another theory are included.

Unifying globally has as its goal creating one overarching theory. The extent to which this may be possible has been discussed in teaching research. Openshaw and Clarke (1970) argued that a single theory of teaching was unlikely to be developed since teaching encompasses several processes. Gage (1963a, b) identified two types of theories of teaching, those focusing on why teachers behave the way that they do and those aiming to elucidate how teacher behavior actually leads to student learning. Shulman (1986) also argued that a single theory of teaching is impossible as

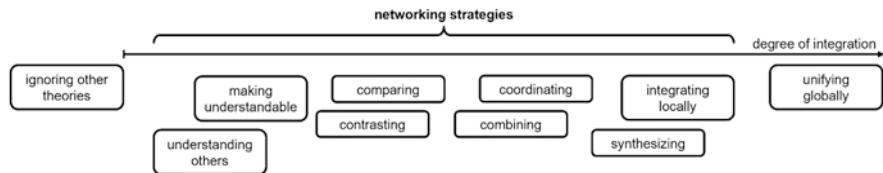


Fig. 1.3 Networking strategies for theoretical approaches proposed by Bikner-Ashbahs and Prediger (2010, p. 492). Reprinted with permission

there is no “real world” of teaching, because different models put the same people into different roles and are oriented for different purposes. Consequently, he argued that a “plurality of theories must not be regarded as a preliminary stage of knowledge which will at some time in the future be replaced by the One True Theory” (p. 14). In a similar vein, Nuthall and Snook (1973) questioned whether one of the ultimate goals of conducting research, being cumulative, is possible at all across multiple models (or theories) since different models address different aspects of teaching and are often based on different assumptions. This resonates well with the statement by Bikner-Ashbahs and Prediger (2010) that a research community should aim to integrate different theories “as far as possible, but not further” (p. 503), implying that very different assumptions cannot be integrated in a useful way.

Klauer (1985), however, suggested that it might be possible to develop an overarching theory:

This situation could be perceived as discouraging if one looked for one theory of teaching that would be adequate for all instructional problems. Alternatively, it could be seen as reflecting the fact that these various attempts are more or less useful for different purposes so that each of them possibly has its appropriate place in a larger frame of reference. Such a frame of reference can be provided by an all-encompassing theory of teaching if it is conceived as a hierarchical theory. (p. 6)

Given the divide in opinions on whether an overarching theory can be developed, this is another open issue that needs to be explored.

8 Aims, Scope, and Structure of the Book

Because there is such a wide range of views on the theorizing of teaching, our goal in this book is to initiate an exchange between internationally recognized scholars towards what Bikner-Ashbahs and Prediger (2010) call a “culture of constructive debate”.

As far as we know, structured exchanges on this topic do not exist, so we decided that it would be useful to focus large parts of the book (see Chaps. 2–9) on the first steps of the networking strategies suggested by Bikner-Ashbahs and Prediger (2010), “understanding others” and “making understandable”. To do this, we asked all contributing authors to answer the same five questions in their chapters. We then

went one step further by “comparing” and “contrasting” the different answers to these questions in the two last Chaps. (10 and 11) of the book. In order to include the most integrated point of the networking strategy, one of the five questions was about the possibility of “unifying globally”. The five questions all of the contributors were asked to answer were formulated on the basis of the literature (see above) as highly diverse. We therefore phrased the first two questions in a very fundamental way:

- What is a theory (of teaching)?
- What should it contain and why?

When we realized that there was a gap between recent literature on teaching research, which has tended to focus on differences between subjects as well as student populations, and the literature on theories of teaching which has not, we added a question on this subject:

- Can such a theory accommodate differences across subjects and student populations? If so, how? If not, why?

Because there is very little overlap regarding theories of teaching named between articles published, we also asked our contributors directly:

- Do we already have a theory/theories of teaching? If so, what is/are they?

Finally, we wanted to know if the experts believed that achieving the highest level of networking identified by Bikner-Ahsbabs and Prediger (2010), “unifying globally”, could ever be achieved:

- In the future, in what ways might it be possible, if at all, to create a (more comprehensive) theory of teaching?

Although the authors were free to reflect on these questions in any way they saw fit, they were explicitly asked to address these questions at some point in their contribution—something that most of them did toward the end of their chapters, after having presented and discussed their own work.

Selecting contributors for the book was a hard task since theorizing teaching can be approached from a number of different angles. In addition to teaching quality, considered in this book, other angles include critical (race) theory (e.g., Howard & Navarro, 2016; Ladson-Billings & Tate, 1995; Ledesma & Calderón, 2015), ecological theories (e.g., Bronfenbrenner, 1989), relational and affective teaching (e.g., Grossman et al., 2009; Lampert, 2001; Noddings, 2001), sociocultural (e.g., Banks & Banks, 2004; Gallego & Cole, 2001; Gay, 2018) and sociopolitical (e.g., Nasir et al., 2016; Nieto, 2005) contexts, historical perspectives (e.g., Kafka, 2016; Sweeting, 2005), and many more. Because networking between theories is most productive if there is sufficient overlap between the theories (Bikner-Ahsbabs & Prediger, 2010), we decided to minimize the diversity between chapters and focus on teaching quality by including several chapters on this subject and added a few contributors to give us a wider perspective. Several criteria were used to select the contributors. First, they had to have been recognized by the international community for their contribution to conceptualizing and investigating teaching. Second, the

contributors to this book either research teaching in general and/or examine the particular demands that teaching mathematics imposes on teachers. Third, we wanted to bring together an international group of researchers, including scholars from the two continents where most of the empirical research on teaching has been published over the past decades, Europe and North America. Because we wanted to include an Asian perspective, we also invited a group led by a Chinese scholar to join this project (Chap. 8). Finally, we opted to enrich this selection with a perspective that specifically views teaching as an act of communication (Chap. 9). Although these criteria were deemed necessary for the purposes of this exercise, it is important that future networking exercises shift their focus to other geographical regions, traditions, paradigms, and school subjects.

9 Conclusion

We believed that by bringing together a group of internationally recognized scholars of teaching, advances could be made in defining theories of teaching, better understanding their constituent elements, and developing a sense of the ways in which such theories can be generated, presented, or further expanded. Given Kurt Lewin's well-known motto "nothing is as practical as a good theory," it was anticipated that these advances could have not only theoretical but also practical benefits for the deeper understanding and improvement of teaching. Biddle and Anderson (1986, p. 245) echo this, by passionately arguing for the careful study and understanding of teaching:

[W]ho will save our threatened civilization if not its educated citizens? We all have a stake in education, then, and if teaching makes a difference in the lives of pupils, we clearly must learn more about teaching. The task may be a lot more complex than we thought it was, but we do not have viable alternatives to acquisition of the knowledge that research on teaching can provide.

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¹*Indicates that the references were identified in the literature search.

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