ESSAY

The Nature and Power of Conceptualizations of Learning

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Abstract

Metaphors are at the core of conceptualizations from which actions and practices in teaching and learning emerge. Much of the literature in the learning sciences and educational psychology research is based on assumptions emergent from conceptualizations of learning grounded in a *construction* metaphor of learning: meaning is individually, collaboratively, and collectively constructed in situationally mediated contexts. The literature also argues that people outside these domains tend to have conceptualizations of learning grounded in a *transfer/ acquisition* metaphor of learning which sees knowledge as consisting of discrete entities and learning as the transfer of those entities into the minds of learners. Practices grounded in these conceptualizations are inextricably tied to issues of agency and empowerment. This article explores these issues from a critical theory perspective using a new theoretical framework for analyzing conceptualizations and briefly presents three illustrative empirical studies of conceptualizations of learning in society, educational policy, and educational psychology.

There is a rich tradition of educational psychology research which has consistently called for a dramatic change in practices and views of education and learning. This tradition can be traced back to over a century ago when Dewey (1897) argued for education as "a process of living and not a preparation for future living" (p. 7). Later in his life, Dewey (1938) articulated a more nuanced version of his vision that called for greater learner agency, experiential learning, and de-emphasizing knowledge in favor of developing skills and dispositions. Vygotsky (1934/1986) elaborated a vision in which education is a social process of activity within and

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upon the sociohistorical situation. However, these calls for radical transformation of practices, goals, and perspectives were never realized on a large scale (Kliebard 1995). Over the last century, little has changed in educational practice or in what Western society believes regarding the nature of learning, what education looks like, or the purpose of education (Tyack and Cuban 1995). Current practices are failing our students in terms of developing deep conceptual understanding (National Research Council 2012; Schank 2016). Our students continue to develop only shallow understandings, accumulate vast amounts of irrelevant and disconnected pieces of knowledge, and fail to develop into critical thinkers capable of deep reflection and action as agents of change in their own lives and social transformation toward social justice and equity (Espinoza and Vossoughi 2014; Collins 2017; Giroux 2014).

This paper builds a conceptual framework through which transformational and empowering visions can be interpreted and operationalized in the context of current perspectives in educational psychology research. This conceptual framework draws from educational psychology, philosophy, sociology, and linguistics and argues that conceptualizations—with a specific focus on conceptualizations of learning—are constituted through the interaction of analogies, metaphors, worldviews, and paradigms. Furthermore, conceptualizations of learning lead to observable phenomena in the form of practices, choice of words, cognitive filtering, and value statements which can be systematically analyzed and evaluated. Educational practices grounded in a particular conceptualization of learning may appear ineffective or meaningless when they are seen through the lens of a fundamentally different conceptualization of learning. For instance, if an educator conceptualizes learning as the transfer of knowledge from external sources into the minds of students, s/he may view practices such as examinations of power and privilege to be a waste of valuable class time. On the other hand, if another educator conceptualizes learning as the creation of new meaning, it is possible that she would see practices such as lecturing or exams as a waste of valuable class time. This phenomenon can potentially limit possibilities for implementation of certain educational practices such as interest-driven collaborative project-based learning and pedagogies of emancipation, critical consciousness, and agentic authorship of self and society. Driven by our belief that a conceptual framework is needed through which not only the constitution of conceptualizations of learning but also the potential impact of conceptualizations on practices can be analyzed, we developed the Iceberg Framework for Conceptualization Analysis. In a number of studies, we have found this framework to be a useful lens in analyzing conceptualizations of learning and believe that it has the potential to move the field forward by providing a means of understanding conceptualizations which account for greater complexity than other frameworks such as worldview theory, frame theory, or conceptual metaphor theory can on their own.

In the first sections of this paper, we develop a conceptual framework— the Iceberg Framework for Conceptualization Analysis—through which to understand conceptualizations. We will use the Iceberg Framework to present aspects of two distinct conceptualizations of learning: the "transfer/acquisition" and the "construction/becoming" conceptualizations. This Iceberg Framework is a structuring device that looks at the surface level as well as the complex underlying levels that are the basis of the conceptualizations. These levels include analogies, metaphors, frames, worldviews, and paradigms (see Fig. 1), which we will discuss in turn. We then explore how interactions between analogies, metaphors, frames, worldviews, and paradigms contribute to the formation of conceptualizations from which practices emerge. In the next sections, we describe the historical development of conceptualizations of learning in the West. In the final sections, we employ critical theory and the Iceberg Framework for Conceptualization Analysis to analyze contemporary conceptualizations of learning, including three illustrative cases.
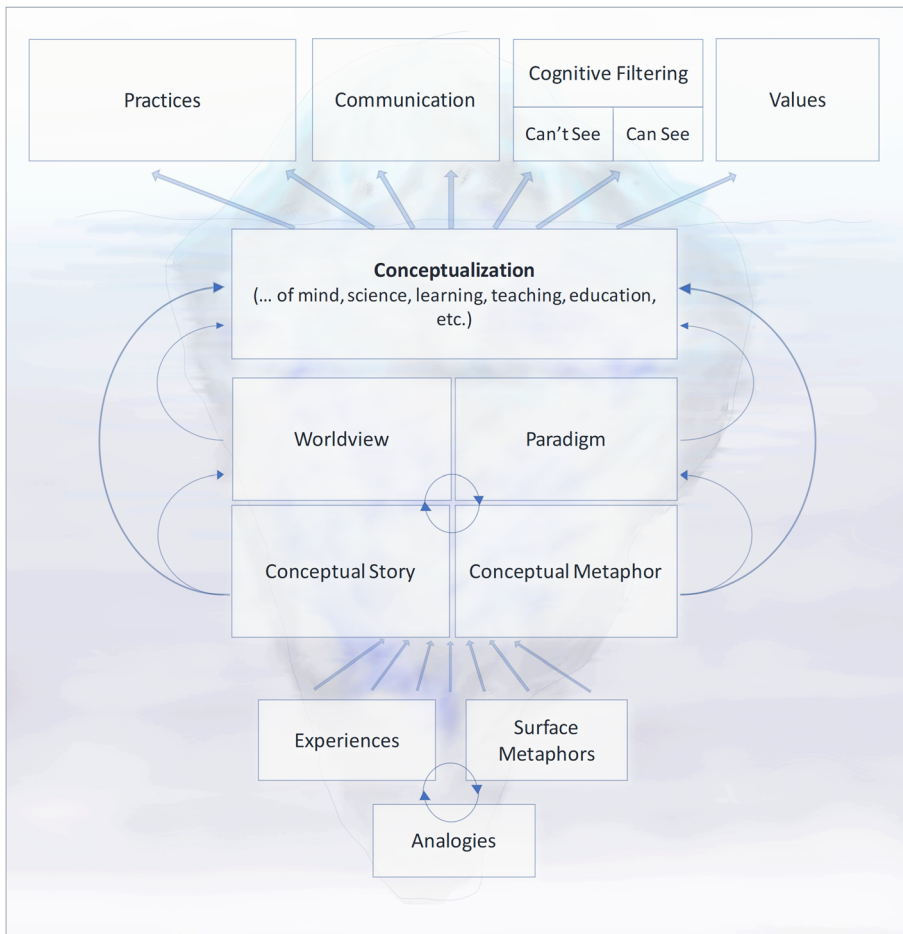
Fig. 1 Iceberg framework for conceptualization analysis

Analogies, Metaphors, and Frames

Analogies, metaphors, and frames provide the foundation upon which conceptualizations are constructed. Hofstadter and Sander (2013) described analogies as the "fuel and fire of thinking" (p. 3) by building a case for the proposition that thought requires concepts, and the formation of concepts requires the use of analogies—the noticing that *this* is like *that*. They argued that all concepts are the result of a multitude of analogies being made over time. When we encounter a new situation, idea, or object, our minds automatically start making analogies. Furthermore, because analogy-making is often an automatic, uncontrollable, and unconscious process, analogies provide the lens through which we experience and interpret situations and therefore determine our conclusions (Hofstadter and Sander 2013). Not only are analogies key to the formation of concepts, but they also are necessary in the process of conceptual change (Gentner et al. 1997). We define analogy as a cognitive process in which an experience is framed in terms of another prior experience.

Metaphors are a class of analogical thinking with complex mapping of characteristics from a source domain onto a target domain in which the source and target domains are dissimilar

(Hofstadter and Sander 2013; Lakoff and Johnson 1980, 1999). For example, in the metaphor *time is money*, the source domain is economic transactions and the target domain is time. Metaphor has been considered an important aspect of human thought since the days of Aristotle (Mahon 1999). Theories of the relationship between metaphor and thought became widespread after the publication of Lakoff and Johnson's *Metaphors We Live By* (1980).

Metaphor plays an important role in frame theory. Frames are the lenses through which we see, think about, and experience a phenomenon (Goffman 1974/1986). Schön (1983) argued that metaphors are inextricably tied to our perspectives and sense-making of the world and that an important aspect of framing is creating generative metaphors—a process of "seeing-as" (p. 184). In other words, framing involves carrying over or *meta-pherein* (Greek) clusters of interconnected and interdependent ideas from one context into another (Schön and Rein 1994). Metaphor theories in the latter half of the twentieth century turned from the literary traditions which saw metaphor as simple A is B formulations (*Juliet is the sun*) toward forms of figurative thinking through which we connect and convey complex meanings (Lanzara 1983). These theories embrace the complexity of metaphor but retain the convention of analyzing metaphors in terms of a topic (or target domain) and a vehicle (or source domain), in which the vehicle term brings something new ways of understanding to the topic (Cameron 1999b). However, a metaphor vehicle does not have to be explicitly stated, and multiple metaphor vehicles are often in play (Cameron 1999b; Ottati et al. 2014).

The metaphor theory which has gained the most traction is conceptual metaphor theory, which situates metaphor as a basic process in human thought (Deignan 2010). The core insight of conceptual metaphor theory is that human concepts are grounded in conceptual metaphors which consist of constellations of surface metaphors. For instance, time is often conceptualized as discrete measurable economic units as evidenced by the constellation of surface metaphors including *time is money*, *spending time*, *investing time in something*, *wasting time*, *giving someone your time*, and so on. The contribution of conceptual metaphor theory is in expanding our understanding of how human concepts are formed and how they impact our perceptions and actions. Lakoff and Johnson (1980, 1999) formulated the basic framework of this theory, which has subsequently been developed by others (e.g. Cameron 2010; Deignan 2010; Gentner and Bowdle 2008; Gibbs 1999, 2008; Goatly 2007; Low and Todd 2010). This theory claims that metaphors are products of both bodily experiences and cultural forces (Gibbs 2014). They are the lenses through which we see the world, are intricately connected with ideologies, and influence our actions (Deignan 2010; Lakoff and Johnson 1980, 1999). We define metaphor in two categories. Surface metaphors are linguistic expressions in which a concept is framed as having a number of structural similarities to another dissimilar concept. Conceptual metaphors are systems of interdependent and interrelated surface metaphors which form, operate, and evolve at the level of society or communities of practice but can be adopted at the level of the individual and therefore can operate as cognitive structures.

Worldviews and Paradigms

Constellations of surface metaphors and analogies combine with our life experiences, habits, and the common practices in our communities. These are what Kuhn (1996) called paradigms and what Kearney (1984) called worldviews. These concepts are related in that they both deal with the nature of knowledge (epistemology) and the nature of reality (ontology) (Lincoln et al. 2011). Worldviews are the sets of beliefs and assumptions held by societies and members of

those societies about the physical and social world (Cobern 1996; Kearney 1984). Koltko-Rivera (2004) in a review of the literature articulated the consensus definition of worldview as a way of seeing the universe and a belief system grounded in epistemic and ontological assumptions regarding reality (what is) and ideal (what should be); what exists and does not exist; what is good and bad; and the desirability of goals, actions, and relationships. This definition of worldview overlaps with Morgan's (2007) definition of paradigms as beliefs and practices shared within a community of practice. Although paradigms have sometimes been equated with worldviews, the practical differentiation is that worldviews describe beliefs and assumptions held by a society and individuals within that society, but paradigms are limited to a community of practice and include not only beliefs and assumptions but also shared practices (Guba and Lincoln 1994; Morgan 2007).

Paradigms and worldviews can be best understood by looking at the tensions between two major positions. On one side is the positivist position characterized by the belief that there is one reality, and knowledge consists of objective truths discovered through experiment and empirical observation (Giroux 2013; Lincoln et al. 2011). On the other side is the constructivist position characterized by the belief that there are multiple constructed realities, and knowledge consists of meanings constructed through interpretation and making sense of experience (Kincheloe et al. 1999; Lincoln et al. 2011). Although a positivist worldview is dominant in society (Giroux 2013; Kincheloe 2008), positivist paradigms in academia have largely given way to a post-positivism characterized by the belief that although there is one reality, it can only be described approximately and imperfectly (Alise and Teddlie 2010; Guba and Lincoln 1994). Constructivist paradigms have gained traction in some academic disciplines, such as those in the social sciences (Lincoln et al. 2011), but still represent a minority of approximately one quarter of social sciences studies as analyzed by Alise and Teddlie (2010).

We define worldview as sets of interrelated and interdependent beliefs in society regarding the nature of reality, particularly social realities. We differentiate worldview from paradigm in that we define paradigm as sets of interrelated and interdependent beliefs and practices within communities of practice regarding the nature of physical realities and the nature of knowledge. For instance, framing social reality in terms of competition and survival of the fittest in contrast to a framing in terms of cooperation and supporting the most disadvantaged members of society would be examples of worldviews. Framing knowledge as truth about reality as determined through objective scientific processes as opposed to framing knowledge as constructed through sociohistorical, contextual, and individual processes would be examples of paradigms.

The Formation of Conceptualizations

Conceptualizations—of learning, of science, of mind, of education, and so on—are grounded in analogies and metaphors as interpreted and transformed by worldviews and paradigms. The conceptualizations in society (or in communities of practice) provide the analogies, metaphors, worldviews, and paradigms. The term conceptualization will be used here to include what Lakoff and Johnson (1980, 1999) called conceptual metaphor, as well as others such as figured worlds (Gee 2014b), frames (Schön 1979, 1983), and cultural models (Bialostok 2002, 2008; Gee 2014b).

Researchers such as Lakoff and Johnson (1980, 1999), Gibbs (1999, 2008), Cameron (1999a), Goatly (2007), Gentner and Bowdle (2008), Low and Todd (2010), and Deignan

and Semino (2010) have demonstrated the viability and value of conceptual metaphor analysis as a means of describing, analyzing, and critiquing conceptualizations. Taking as an assumption the proposition that many (if not all) abstract concepts are based on conceptual metaphors (Deignan 2010), this methodology combines methods from the fields of linguistics, psychology, and philosophy. Conceptualization of target domains can be analyzed through investigation of metaphors from source domains because our mental organization of the target domain is influenced by the organization of the source domain. Identifying and describing the relationships between source domain surface metaphors are the primary means of analysis (Ottati et al. 2014). Speakers are usually not aware of the metaphorical nature of their utterances, but through analysis of patterns of surface metaphors, consistency can be found (Gentner and Bowdle 2008). These patterns are the focus of conceptual metaphor analysis—a research methodology in which systems of related surface metaphors are analyzed to uncover and describe underlying conceptual metaphors and the unique ways of thinking delineated by those conceptual metaphors (Cameron 1999b). However, we believe that conceptual metaphor analysis alone is not sufficient to adequately describe the complexities of conceptualizations, but used in conjunction with analysis of non-metaphorical characterizations, practices, and value statements to interpret worldview and paradigmatic assumptions it can be valuable in characterizing conceptualizations.

The Iceberg Framework of Conceptualizations

We use the term *conceptualization* intentionally to mark a distinction in relation to *concepts*—which are often described as static sets of knowledge regarding a particular idea—and in relation to *conceptual understanding* (Greeno and van de Sande 2007), as well as *conceptual change* research and practices (Hall and Jurow 2015). The term *conceptualize* as a verb suggests a dynamic and complex process, and the term *conceptualization*, we feel, retains these nuances. Gee (2014a) stated that "communication and culture are like icebergs. Only a small 'tip' is stated overtly. A vast amount lies under the surface, not said, but assumed to be known or inferable from the context in which the communication is occurring" (p. 14). The iceberg metaphor is useful in analyzing conceptualizations which are generally below the surface in terms of individual or social awareness, and their relation to observable phenomena. Using the iceberg metaphor as a structuring device, the Iceberg Framework for Conceptualization Analysis proposed here (see Fig. 1) provides a complex systems lens for exploring the analogies, surface metaphors, conceptual metaphors, paradigms, and worldviews which contribute to the formation of conceptualizations, and for analyzing observable phenomena which are emergent from the conceptualization.

The Iceberg Framework adopts conceptual metaphor analysis as a core feature. However, the application of conceptual metaphor theory to investigate conceptualizations of learning is limited in that it only allows for robust description of conceptual metaphors. This framework uses an analytical process similar to conceptual metaphor analysis to investigate relationships between non-metaphorical characterizations to describe conceptual stories. Worldviews and paradigms are described through analysis of non-metaphorical characterizations, practices, and value statements. Critical metaphor analysis (Charteris-Black 2012) extends conceptual metaphor analysis beyond descriptive analysis of conceptual metaphors through critical analysis of the role and function of conceptual metaphors in discourse, power, and social justice issues. The philosophical roots of critical metaphor analysis can be found in Vygotsky's (1934/1986)

observation that: "The word is a direct expression of the historical nature of human consciousness" (p. 256). Rather than understanding conceptualizations as residing inside an individual's mind, it borrows from critical discourse analysis the principle that conceptualizations are only in an individual's mind partially because they are also sociohistorically situated and therefore are contextually distributed among other individual's minds and in artifacts such as books (Gee 2014b). The Iceberg Framework leverages critical metaphor analysis which uses methodologies from critical discourse analysis, particularly in focusing on how discourse is related to power, ideology, institutions, and socially constructed identities, and also in adopting the aim of transforming realities to increase well-being and reduce suffering (Fairclough 2012). It also takes the perspective that language use, especially metaphor use, is simultaneously a product of and producer of social practices—and that such social practices cannot be separated from issues of power and social justice (Gee 2014b). Discourse, in this view shared by critical metaphor researchers, not only structures meaning for individuals, but also structures social constructions of reality (Fairclough and Fairclough 2012).

The Iceberg Framework emphasizes the relationship between conceptualizations below the surface of conscious awareness and observable phenomena above the surface. Conceptualizations impact how we see the word and our actions in the world. However, these impacts are not always obvious until we conduct systematic investigation. The conceptual metaphors upon which these conceptualizations are grounded often have entailments to which we become so habituated that they appear logical and inevitable (Schön 1979). These conceptualizations result in cognitive filtering, determining what we can see and what we cannot see (Deignan 2010). Conceptualizations determine what goes on in not only an individual human mind but also at the societal level. They produce and reproduce ideologies (Goatly 2007), which over time become common sense (Apple 2014).

Conceptualizations impact not only our perceptions but also our practices. They dictate the range of possibilities for action we deem relevant or appropriate (Cobern 1996). Conceptualizations provide the links between events and meanings, and the links between meanings and the actions we take in response (Drazin et al. 1999). Although this impact can be achieved intentionally, as in the use of surface metaphors by politicians to elicit particular voting and consent behaviors (Ottati et al. 2014), it often operates outside the realm of conscious awareness. Metaphors create social realities and determine social practices (Lakoff and Johnson 1980). The impact of conceptualizations on practices can be seen on the individual level, as well as the social level. For instance, Lakoff and Johnson (1980) argued that the metaphor *time is money* led to the Westernization of many cultures. In the Iceberg Framework, the relationship between conceptualizations and practices is investigated by looking at what practices are endorsed and what practices are condemned, as well as looking at non-metaphorical characterizations of relevant phenomena.

Methodological Considerations in the Iceberg Framework for Conceptualization Analysis

Analysis of conceptualizations using the Iceberg Framework for Conceptualization Analysis involves use of conceptual metaphor analysis along with critical metaphor analysis and aspects of grounded theory and case study methodologies. Table 1 describes the definitions, functional levels, and types of evidence for each analytical element.

The process starts by identifying the conceptualization you wish to analyze. This could not only be learning (as is the focus here), but it could also be conceptualizations of science,

Table 1 Analytical Elements in the Iceberg Framework for Conceptualization Analysis

Element	Definition	Functional level	Types of evidence
Analogy	Framing an experience in terms of another previous experience	Cognitive	Stories, non-metaphorical characterizations
Surface metaphor	Framing a concept in terms of another dissimilar concept	Cognitive; linguistic	Linguistic metaphors
Non-metaphorical characterization	Non-metaphorical description or definition of a concept	Cognitive; linguistic	Non-metaphorical descriptions and definitions
Value statement	Assertion regarding goals and what is valuable, important, or relevant	Cognitive; linguistic	Statements of goals and what is valuable, important, or relevant
Conceptual metaphor	System of interrelated and interdependent surface metaphors defining a concept	Social; community of practice	Co-occurrence patterns of surface metaphors
Conceptual story	System of interrelated and interdependent non-metaphorical characterizations defining a concept	Social; community of practice	Co-occurrence patterns of non-metaphorical characterizations
Worldview	System of interrelated and interdependent beliefs about the nature of social reality within a society	Social; community of practice	Co-occurrence patterns of value statements and non-metaphorical characterizations related to social reality
Paradigm	System of interrelated and interdependent beliefs and practices related to the nature of physical reality and knowledge within a community of practice	Social; community of practice	Co-occurrence patterns of value statements and non-metaphorical characterizations related to physical reality and the nature of knowledge
Conceptualization	System of interrelated and interdependent conceptual metaphors, conceptual stories, worldviews, and metaphors	Social; community of practice	Co-occurrence patterns of conceptual metaphors, conceptual stories, worldviews, and metaphors

justice, race, or anything else. Collection of data will need to ensure a corpus is created which includes robust evidence of analogies, surface metaphors, non-metaphorical characterizations, and value statements. Once appropriate data is collected, the coding stage can begin, starting with coding of surface metaphors. To identify metaphors in data consistently, we suggest using the Pragglejaz Group's (2007) Metaphor Identification Procedure (MIP)—a step-by-step method of determining whether a word or phrase is metaphorical in nature—and then code for non-metaphorical characterizations and value statements. The next stage is co-occurrence analysis of surface metaphors. The clustered patterns you find here will help you characterize the underlying conceptual metaphors. Co-occurrence analysis of non-metaphorical characterizations of conceptus will help you characterize the conceptual stories. Co-occurrence analysis of value statements and non-metaphorical characterizations related to social reality will help you characterize worldviews. Co-occurrence patterns of value statements and non-metaphorical characterizations related to physical reality and the nature of knowledge will help you characterize paradigms. Co-occurrence patterns of conceptual metaphors, conceptual stories, worldviews, and metaphors will reveal patterns you can then use to characterize the conceptualization of the phenomenon you are studying. You can also use these patterns to assist in the next stage of critical analysis where you investigate the relationship between the conceptualizations and the observable surface phenomena (practices, communication, cognitive filtering, values) in terms of issues of power, including agency, marginalization, oppression, empowerment, equity, and so on.

The next sections will lay the theoretical groundwork for analysis of the category of conceptualizations of interest here—conceptualizations of learning.

Historical Development of Western Conceptualizations of Learning

Before discussing current conceptualizations of learning through the lens of the Iceberg Framework for Conceptualization Analysis, we will briefly review historical conceptualizations of learning in Western society.

The Tabula Rasa Conceptualization of Learning

Throughout much of Western history, learning was understood through the metaphor of *tabula rasa* (Jager 2000). This Latin phrase describes a tablet or slate on which nothing has been written, a view of the mind which can be traced back to Book III, Section 4 of Aristotle's *On the Soul* (c. 350 b.c.e./n.d.). In this *blank slate* conceptualization, learning was seen as the writing of knowledge upon a blank mind by an external active agent—a teacher, a book, or the external environment. There are several variations of the *tabula rasa* metaphor in the field of education. One variation is a metaphor in which the student is a *lump of clay* subject to *molding* by the teacher (Scheffler 1960). Another uses the metaphor of an *empty vessel* to describe students, and the role of the teacher is *filling* those empty vessels. For many centuries, *tabula rasa* informed philosophical discourse, culminating in re-formulations by John Locke, Jean-Jacques Rousseau, and Sigmund Freud (Jager 2000). Over the last century, overt reference to this metaphor has largely faded from public and academic discourse concerning education, but the influence of the *tabula rasa* view of the educator as active agent continues to this day in common educational practices. The most obvious indicator of this legacy is the *knowledge as object* metaphor.

Industrial Conceptualizations of Learning

With the industrial revolution came a more mechanistic metaphor of the mind in the *mind as a machine* metaphor (Kincheloe et al. 1999). Related to this was the *education as industry* metaphor in which schools were seen as factories in which technical workers (teachers) processed raw materials (children), which ultimately led to goals of efficiency and standardization (Bransford et al. 2000). The impact of this metaphor can be seen today in practices such as standardized assessments, standardized curricula, and age-grading (Collins and Halverson 2010). The *education as industry* metaphor gained even greater traction in the late twentieth century in the form of the *education as business* metaphor (Tyack and Cuban 1995) supported by the increasing dominance of neoliberal free-market capitalism which sees students a human resources or raw materials to be processed into forms dictated by market demand (Greene 1995).

In the wake of Charles Darwin's work, the *mind as machine* metaphor expanded to include biological organisms. Minds were seen as complex machines, leading to the *mind as biological machine* metaphor in the behaviorist approach led by John B. Watson and B.F. Skinner which described learning in terms of stimulus and response and saw education as a process of behavior modification through conditioning (Watson 1925).

Contemporary Conceptualizations of Learning

Starting in the last half of the twentieth century, the *mind as machine* metaphor evolved into the *mind as computer* metaphor. In the most common variation of this metaphor, learning is seen as a process of *transferal* of knowledge from an *external source* into a *central processing unit* in the student's mind, which then *encodes* that information into the mind's *long-term memory storage* areas for later *retrieval* (Lakoff and Johnson 1999).

Other metaphors in education describe the practice of education in terms of *gardening* (Scheffler 1960) in which learners are *plants*, and the work of the educator is to create a *nourishing* environment with plenty of sunlight, water, and fertilizer—and to do weeding and trimming as needed. Other educators describe their work through the metaphor of a *journey*: they act as a *guide* and *traveling companion* to their students on the *journey* (Gatti and Catalano 2015). This metaphor is often used in conjunction with the *learning as discovery* metaphor and *teacher as coach* metaphors (Brown 1992).

The Transfer/Acquisition Conceptualization of Learning

With historical conceptualizations of learning in mind, we turn now to conceptualizations of learning common in Western society today. A body of literature argues that the currently dominant conceptualizations of learning are grounded in a *transfer/acquisition* conceptual metaphor of learning (e.g., Bruner 1996; Kincheloe and Steinberg 1998; Papert and Harel 1991). The *transfer/acquisition* conceptualization sees knowledge as consisting of discrete entities, and learning as the transfer of those entities from authoritative sources such as teachers and books into the minds of learners. Learners are then expected to be able to transfer the acquired knowledge to new contexts (Shemwell et al. 2015). Hager and Hodkinson (2009) argued that although this is the dominant metaphor in society today, it is rarely recognized as such, but rather seen as common sense.

Dewey (1897) was the first educational researcher to point out the *transfer/acquisition* conceptualization of learning, arguing that the failure of education was due to the conceptualization of "the

school as a place where certain information is to be given" (p. 8). Later, Dewey (1938) described the conceptualization in greater detail using related surface metaphors such as *transmit* (p. 2), *acquisition* (p. 5), and *product* (p. 5). Freire (1970/2005) articulated additional aspects of this conceptualization by critiquing the *banking* metaphor of learning and education. This conceptualization of learning, he argued, turns students into *receptacles* and *containers* which are *filled* by the teacher.

The *transfer/acquisition* conceptualization of learning consists of a constellation of interrelated surface metaphors for knowledge (e.g., *give*, *product*, *possession*, *property*, *competencies*, *outcomes*, etc.), mind (e.g., *container*, *receptacle*, *customer*, *raw materials*, *machine*, etc.), learning (e.g., *acquisition*, (*to be*) *filled*, *receiving*, *storing*, *taking*, *absorbing*), and education (e.g., *transfer*, *transmit*, *banking*, *factory*, *production*, *market*, *business*). Experiences and analogies form an interrelated system of non-metaphorical characterizations of knowledge as an external thing which can be received by a learner who then possesses the knowledge. The system of value statements and non-metaphorical characterizations related to social reality contribute to a worldview in which learning is a process that occurs at the individual level and therefore subject to individual-level assessment and competition. Value statements and non-metaphorical characterizations related to physical reality and the nature of knowledge form a positivist or post-positivist paradigm in which there is one reality and knowledge refers to truth about reality determined through empirical and objective analysis of evidence. See Fig. 2 for a visualization of the *transfer/acquisition* conceptualization of learning through the Iceberg Framework for Conceptual Analysis.

The conceptual metaphors and conceptual stories in this conceptualization reveal the assumption that knowledge consists of discrete entities with correct meanings and that the purpose of education is to ensure that students acquire those correct meanings (Kincheloe 2003). Giroux (2013) argued that this dominant conceptualization of learning and education is grounded in the principles of positivist ideology. The positivist ontological and epistemological stance has an entrenched foothold in society because it has used claims of objectivity and neutrality to achieve the status of common sense (Giroux 2001). This foothold is strengthened by consumer capitalist culture where knowledge is seen as a consumer good—a possession with value equated with one's material and cultural capital. Sandlin and McLaren (2010) argue that because the domain of production is seen as the source of all value, the purpose of education is assumed to be the fulfillment of the needs of capital. The mechanistic surface metaphors of learning in the *transfer/acquisition* conceptualization work in conjunction with business metaphors of education to support the individualist/competitive/consumerist set of worldview assumptions to perpetuate the belief that the purpose of education is to meet the demands of the corporate world (Apple 2014).

The *transfer/acquisition* conceptualization of learning leads to a particular set of mutually reinforcing practices in teaching and learning. Because knowledge is seen as objects to be transferred into the minds of students, books are seen as the primary source of these objective facts (Dewey 1938). In order to ensure that the knowledge has been effectively acquired, students must frequently be made to take exams (Stein et al. 2016). The transfer of pieces of information is carefully planned. Therefore, education is increasingly focused on learning objectives, learning outcomes, competencies, and standardized curricula and materials (Apple 2014).

The logic of this "common sense" conceptualization of learning as commodity acquisition is profoundly entrenched in our society (Hager and Hodkinson 2009). If knowledge is to be acquired, and if acquisition of greater amounts or quality of knowledge is desirable, then knowledge is a commodity and acquisition can (and must) be measured. Standardized tests measure an individual learner's value by measuring accumulation of knowledge (Clark 2005). Anything which cannot be

Practices	Communication	Cognitive Filtering	Values
lectures, textbooks, exams, grading, content knowledge work, teacher-directed problem solving, homework, worksheets	acquisition, transfer, transmit, truth, assessment, logic, authority, getting knowledge	outside the boundaries of normal cognitive perception: intersubjectivity, mediated, socio-historical situatedness, distributedness	reasoning, productive citizens, basic knowledge, competition

Conceptualization of Learning
Transfer/Acquisition

Worldview
Individualist/Competition

Paradigm
Positivist/Post-Positivist

Conceptual Story
Object Possession

Conceptual Metaphor
Acquisition and Object Manipulation

Experiences

Surface Metaphors

Analogies

Fig. 2 The transfer/acquisition conceptualization of learning through the Iceberg Framework

measured through tests has—by definition—no value (Ohanian 2009). Therefore, educational practices which do not directly increase students' value as measured by standardized tests measuring retention of pieces of information are deemed irrelevant and a waste of time (Kincheloe et al. 1999). Efficiency and effectiveness of curricula and educational practices in ensuring that the maximum number of students accumulate the maximum amount of knowledge becomes the only area of educational research seen as widely applicable in educational contexts (Guisbond et al. 2013).

The Construction Conceptualization of Learning

In contrast with the dominant conceptualization of learning, much of the literature in the learning sciences and some areas of educational psychology are grounded in a *construction/*

becoming metaphor of learning: learning is a change in who a person is and occurs through individual, collaborative, and collective construction of meaning (e.g., Bransford et al. 2000; Bruner 1996; Collins and Halverson 2010; Kafai and Burke 2014; Kincheloe et al. 1999; Papert and Harel 1991; Stahl et al. 2014).

The *construction* metaphor of learning has origins in the work of Piaget (1952) who saw learning as the construction of meaning within learners' individual minds. However, earlier indications of this metaphor can be found in Dewey (1897) who used phrases such as "constructive activities" (p. 11) and "reconstruction of experience" (p. 13). Piaget (1952) developed the metaphor into a theoretical framework to explain learning in children. Vygotsky (1934/1986, 1978) and Bruner (1986, 1996) introduced a sociohistorical dimension to the *construction* conceptualization of learning. In critique of Piaget's theory, Vygotsky (1934/1986) argued that Piaget saw children as isolated individuals upon which social factors have impact. He developed his theory around the proposition that learning is a sociocultural activity in which linguistic tools and interaction with others are the driving force. Bruner (1986) integrated Piagetian and Vygotskian theories to acknowledge both individual construction of meaning and social construction of meaning.

The *construction/becoming* conceptualization of learning consists of a constellation of surface metaphors for knowledge (e.g., *constructed*, *systems of relations*, *subject/object fusion*), mind (e.g., *constructor*, *translator*, *world transformer*, *networks of schemata*), learning (e.g., *construction*, *transformation*, *creation*, *design*), and education (e.g., *socialization*, *scaffolding*, *community of practice*, *perspective expansion*, *praxis*). A system of interdependent non-metaphorical characterizations forms a conceptual story in which learning is about *becoming* through relationships with others and contextually driven interactions with people, tools, language, and practices. Value statements and non-metaphorical characterizations related to social reality form a system leading to a worldview in which learning is a collaborative process and cognition is distributed across multiple minds, bodies, and tools in cooperative contexts. The system of interrelated value statements and non-metaphorical characterizations related to physical reality and the nature of knowledge form a constructivist paradigm in which knowledge is socially constructed and there are multiple realities each of which has validity. See Fig. 3 for a visualization of the *construction* conceptualization of learning through the Iceberg Framework.

In the *construction/becoming* conceptualization of learning, the idea that learning involves construction of meaning implies that knowledge is constructed. This aligns with constructivist and interpretivist epistemological and ontological beliefs and assumptions regarding the nature of reality and knowledge (Bruner 1986; Kincheloe et al. 1999). This conceptualization can lead to cognitive filtering. For instance, it may become impossible to see absolutes and "common sense reality," often accompanied by a focus on exploration, deconstructing socio-historical reality, and critical analysis (Kincheloe 2003).

The *construction/becoming* conceptualization impacts practices in teaching and learning, which tend toward collaboration, project-based learning, student-directed learning, metacognitive practices, self-assessment, and sharing learner-created artifacts with a wider audience. Interest, motivation, and passion are central to this view of education (Bransford et al. 2000). Learning involves the whole person—a person situated in and inextricably connected to a social, cultural, activity, and physical context (Lave and Wenger 1991). Because construction of meaning is a design, problem-solving, and building process (Blikstein 2013; Carroll 2014; Packer and Maddox 2016), learning environments encourage failure and iteration (Bransford et al. 2000; Papert 1999). Meanings are constructed collaboratively

Practices	Communication	Cognitive Filtering	Values
projects, collaboration, perspective taking, self-evaluation, reflection, learner agency, interest-based learning, real-world impact work, critical work	construction, becoming, context, process, ways of knowing, modeling, identity, participation, mentoring	outside the boundaries of normal cognitive perception: knowledge as object, quantification of learning, knowledge transmission	empathy, authenticity, democratic engagement, social justice, global citizenship

Conceptualization of Learning
Construction/Becoming

Worldview
Collaborative/Cooperative

Paradigm
Interpretivist/Constructivist

Conceptual Story
Situated Becoming

Conceptual Metaphor
Construction

Experiences

Surface Metaphors

Analogies

Fig. 3 Construction/becoming conceptualization of learning through the Iceberg Framework

through processes of negotiation and sharing (Stahl et al. 2014). These assumptions and practices may privilege collaborative and collective practices over the individual, as well as valuing interest-based and emergent processes over thematically oriented and staged curricula.

Agency and Empowerment in Conceptualizations of Learning

At the core of these two dominant conceptualizations of learning is a fundamental difference in beliefs regarding who should have agency in decisions about learning. The *transfer/acquisition* conceptualization engenders the assumption that teachers, schools, districts, curriculum designers, and instructional designers have the authority to make decisions regarding what students will learn, how they will learn it, and how they will be assessed. Situating the primary locus of agency and authority external to the student may lead to learners being extrinsically

motivated (Renninger et al. 2018). The goal of education is the production of people who know what is decided that they should know and do what is determined they should do (Giroux 2013). Dewey (1938) expressed concern about this view of authority and since then constructivist education has involved critique of who has the authority to construct and curate knowledge (Kincheloe et al. 1999).

In contrast, the *construction/becoming* conceptualization of learning assumes that learners have agency. Not only do learners have the authority to make decisions regarding what they will learn and how they will go about learning, learners are placed in a position of human dignity which respects their intelligence, abilities, and ways of knowing. Students are expected to collaboratively create their own meanings and shape their own classroom experiences. Situating the locus of agency and authority as shared between learners may facilitate learners' development of intrinsic motivation (Renninger et al. 2018). The goal of education is to empower people to shape themselves and transform society (Freire 1970/2005).

Conceptualizations of learning are inherently tied to issues of power, and therefore, they can be leveraged for liberatory and empowerment practices in educational contexts. Conceptualizations have political consequences because whoever has the power to impose metaphors in society has the power to determine truth (Lakoff and Johnson 1980). Dewey (1938) recognized this dilemma and argued that we should disrupt the traditional ideas of education in which authority is exercised over what and how students learn. He realized that there was an inherent tension between his conceptualization of learning and the traditional conceptualization in terms of agency and empowerment. Bourdieu and Passeron (1970/1990) problematized education itself, positing that pedagogic action is always a form of symbolic violence and that imposition of authority is reproduced because the nature of education is to produce and reproduce the ideologies of the dominant class. This diagnosis assumes that the *transfer/acquisition* conceptualization remains entrenched, since it contains mechanisms for reproduction as operationalized through scientific management of classroom activities (Giroux 2001). Thus, not only schooling becomes the site of knowledge transfer and acquisition, but also—and equally important—it becomes the vehicle for the hidden curriculum which teaches students to internalize assumptions about their positionality (power, race, gender, socioeconomic status), individualistic/competitive worldviews, and positivist beliefs regarding the nature of knowledge, mind, and learning (Kincheloe 2003). Standards, then, become not only a mechanism of power and social control (Ohanian 2009), but also the means by which oppression is hidden (Giroux 2001). These complex interactions between various aspects of the *transfer/acquisition* conceptualization of learning thus remain entrenched as the common-sense approach (Apple 2014).

Building on Freire's (1970/2005) pedagogy of the oppressed, Giroux (2013) argued that in order to change educational practices, we have to change how education and learning are conceptualized. Bringing about this change in thinking is the core of critical pedagogy, which helps learners interrogate, problematize, and disrupt systems of power (Sandlin and McLaren 2010). Critical pedagogy challenges the *transfer/acquisition* conceptualization of learning through questioning assumptions about who has the authority over the construction of knowledge, educational practices, and values (Giroux 2013) and through practices in which teachers and students share authority to collaboratively construct and transform knowledge (Kincheloe 2003). In short, the empowerment practices in critical pedagogy involve helping people reject the *transfer/acquisition* conceptualization of learning and thoughtfully developing their own conceptualizations, often through ideas and practices from the *construction/becoming* conceptualization of learning. Moreover, critical pedagogy and the critical theories

upon which they are grounded have extended to other conceptualizations through a critical race theory in education analysis (Ladson-Billings and Tate 1995).

Illustrative Cases

We now present three illustrative cases to demonstrate the methodology, nature of findings, and implications of using the Iceberg Framework for Conceptual Analysis as a theoretical framework for analysis of conceptualizations of learning. In the first illustrative case we investigated conceptualizations of learning among adults in the USA. This case was selected to demonstrate the Iceberg Framework as used with individual people as the primary unit of analysis. In the second illustrative case, we investigated conceptualizations of learning related to public policy documents. This case demonstrates the use of the Iceberg Framework to focus on a larger social frame. The third illustrative case investigated conceptualizations of learning among educational psychologists through analysis of articles from two educational psychology journals.

Illustrative Case 1: Public Perceptions of Learning

The first illustrative case is a study of conceptualizations of learning among a sample of people from the general population of adults in the USA. We collected short (3 to 5 min) audio clips of participants ($n = 200$) responding to the question "What is learning?" through Amazon's Mechanical Turk service, an online crowdsourcing platform through which researchers and businesses can recruit workers to complete small tasks for a fee (Follmer et al. 2017). The ages of participants ranged from 18 to 70 with a near-normal distribution. There was a range of education levels from high school or equivalent through doctorate and a diversity of occupations. We analyzed transcripts (69,564 words total) line-by-line in the MAXQDA qualitative analysis software. We used the Iceberg Framework for Conceptualization Analysis methodology as described in a previous section.

   Coding resulted in 1162 coded instances of surface metaphors of learning. Our analysis of co-occurrence patterns found four primary conceptualizations of learning (*transfer/acquisition*, *participation*, *construction*, and *biological*). Although the majority of transcripts contained surface metaphors related to one conceptualization, some transcripts contained a mixing of conceptualizations. Our findings supported the claim that the *transfer/acquisition* conceptualization is dominant in American society: One hundred and fifty-eight participants (79.0%) used surface metaphors related to this conceptualization. Twenty-seven participants (13.5%) used a *participation* conceptualization of learning. The *construction* conceptualization was used by 21 participants (10.5%). Fifteen participants (7.5%) used a *biological* conceptualization. Forty-six participants (23.0%) used other conceptual and surface metaphors (*journey*, *perspective*, etc.), but always in conjunction with one of the four dominant conceptualizations. Participants who used a *transfer/acquisition* conceptualization of learning tended to use only related surface metaphors, and among this group those who mixed metaphors used metaphors not related to the other conceptualizations of learning. Participants who used the *participation*, *construction*, or *biological* conceptualizations of learning tended to use related metaphors, but in this group those who mixed metaphors used surface metaphors from the other primary conceptual metaphors except *transfer/acquisition*. These two patterns suggest that (1) the *transfer/acquisition* conceptualization may be mutually exclusive in relation to the other

primary conceptualizations of learning and (2) the other primary conceptualizations of learning may not be mutually exclusive.

Illustrative Case 2: Conceptualizations of Learning in the Every Student Succeeds Act

The second illustrative case is a study of conceptualizations of learning in policy documents. The Every Student Succeeds Act of 2015 (ESSA) is federal legislation reauthorizing the 1965 Elementary and Secondary Education Act. It replaces the 2001 reauthorization known as the No Child Left Behind (NCLB) Act, one of the most significant pieces of federal educational legislation of our time (Husband and Hunt 2015). We collected the full text of ESSA and 46 policy resources. We searched publications from the 50 most influential policy institutes and think tanks for documents relating to ESSA, but the majority of them produced no documents discussing the legislation. We narrowed down our sources of data to available documents from the American Enterprise Institute (13 documents), the Brookings Institution (10 documents), the Heritage Foundation (8 documents), Cato Institute (3 documents), Center on Budget and Policy Priorities (3 documents), the Learning Policy Institute (2 documents), and policy discussion in various other academic journals and organizations (7 documents). We urge caution in interpreting our findings because we were limited to only documents available from this limited sample of organizations which have ideological perspectives they intentionally promote. We used the Iceberg Framework for Conceptualization Analysis methodology.

The *transfer/acquisition* conceptualization was the dominant conceptualization of learning. Also emergent from the data was a *business/management* conceptualization which sees education as a business enterprise in which the "product" is test scores, and the goals are efficiency, standardization, growth/improvement, and innovation. This conceptualization also emphasized assessment, accountability, and quality control and may have roots in the industrial factory model of education and efficiency and quality-control management theories (see also: Kliebard 1995; Kincheloe et al. 1999). Only one resource used surface metaphors related to the *construction/becoming* conceptualization, although it appeared in only one sentence and the *transfer/acquisition* conceptualization was prominent throughout the remainder of the document. Purposes of education were aligned with the dominant conceptualization. The purpose of education in this data was the preparation of students for jobs and to improve the national economy. Expressions of these assumptions were within close proximity to expressions related to the *business/management* conceptualization of education or the *transfer/ acquisition* conceptualization of learning. The overwhelming dominance of the *transfer/ acquisition* conceptualization of learning—supported by the *business/management* conceptualization of education and a positivist paradigm—throughout the text of the ESSA and all policy documents analyzed supports the critical theory perspective that the *transfer/acquisition* conceptualization is codified not only within the structures of society but also in policies and regulations. This supports, furthermore, critical theory literature which argues that the *transfer/ acquisition* conceptualization of learning contains mechanisms for reproducing itself.

Illustrative Case 3: Conceptualizations of Learning in Educational Psychology Journals

The third illustrative case is a study of conceptualizations of learning in articles in educational psychology. The corpus for this study consisted of 239 articles from the American Psychological Association journals *Educational Psychologist* (EP) and *Journal of Educational Psychology* (JEP) from a 5-year period from 2013 to 2017. The Iceberg Framework for

Conceptualization Analysis methodology described in an earlier section was used and resulted in 199 coding categories in 4123 coded segments.

The *transfer/acquisition* conceptualization was dominant in both APA journals, with the *construction/becoming* conceptualization being used occasionally. The two APA journals were different in how authors conceptualized learning (Fig. 4). The journal *Educational Psychologist* had a mix of both conceptualizations of learning while favoring the *transfer/acquisition* conceptualization (73.9 to 58%), but the *Journal of Educational Psychology* was heavily dominated by the *transfer/acquisition* conceptualization (97.6 to 16.5%). In both journals, articles grounded in cognitive load and schema theory exclusively used the *transfer/acquisition* conceptualization.

Within the two conceptualizations of learning, there were different orientations. In the *transfer/acquisition* conceptualization, there were two orientations: economic and computer. The economic orientation uses business and economic surface metaphors and non-metaphorical characterizations such as production, career, economic growth, accumulation, making gains, possession, and competition to describe teaching and learning. The computer orientation equates the human mind with computers and uses concepts such as long-term memory, short-term memory, working memory, buffer, access, retrieval, load, processing, storage, and encoding. This was especially prevalent in articles using cognitive load theory. In the *construction/becoming* conceptualization, there were three orientations: collective, identity, and generative. The collective orientation was characterized by sociocultural ways of knowing and included participation, community of practice, peer-mediated learning, distributed cognition, social justice and critical work, negotiated meanings, learning ecologies, and democratic social engagement. The generative orientation framed learning as the construction of knowledge and included learner-driven project-based and problem-based learning, design work, knowledge building, creativity, experimentation, tinkering, and free exploration. The identity orientation
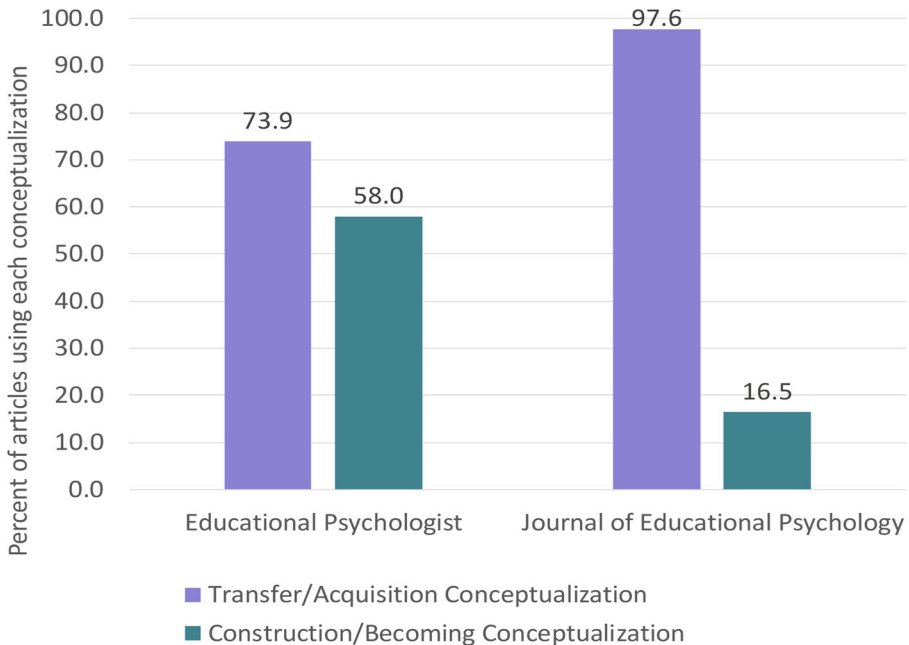

Fig. 4 Conceptualizations of learning in educational psychology journals

used an apprenticeship framing and involved concepts such as identity exploration, learner agency, becoming, personal transformation, evolution, and ownership of learning.

The *transfer/acquisition* economic orientation was the most frequently used in both journals (see Fig. 5), appearing in 50.7% of EP articles and 67.6% of JEP articles. This was followed by the *transfer/acquisition* computer orientation (42% of EP articles and 57.1% of JEP articles). The EP articles used the *construction/becoming* orientations more than the JEP articles. Within the EP articles, the generative orientation was most frequent (33.3%), followed by the collective orientation (24.6%) and the identity orientation (14.5%). In the JEP, the generative and collective orientations were used in 5.3% of articles, and the identity orientation was used in only 1.2% of articles.

Many of the practices endorsed in the articles in both journals were aligned with one of the two conceptualizations of learning. Practices endorsed more frequently in JEP articles aligned with the *transfer/acquisition* conceptualization of learning. These included endorsement of grades, homework, lectures, memorization, teacher-led problem solving, testing, textbooks, and worksheets. Articles EP tended to endorse practices more aligned with the *construction/becoming* conceptualization of learning such as learner agency, collaboration, discussion, productive failure, identity exploration, and reflection (see Fig. 6).

The finding of a dominance of the *transfer/acquisition* conceptualization of learning in educational psychology journal articles reflects the findings in the previous illustrative cases. However, the greater frequency use of the *construction/becoming* conceptualization in *Educational Psychologist* journals compared to the *Journal of Educational Psychology* articles suggests that there are differences among educational psychologists. Some of the differences may be attributable to the makeup of the editorial boards of each journal, specifically the presence of a number of learning scientists on the board of *Educational Psychologist* since research in the learning sciences tends to use situative theoretical frameworks (Hoadley 2018). Furthermore, the finding of an alignment between the conceptualizations of learning and endorsement of certain practices suggests that how educational psychologists conceptualize learning impacts what practices they believe best facilitate learning.
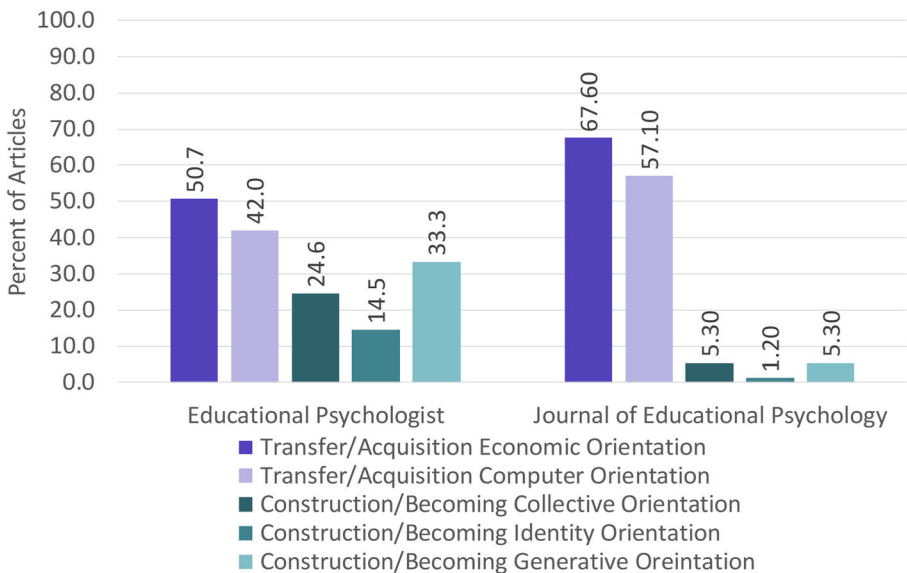

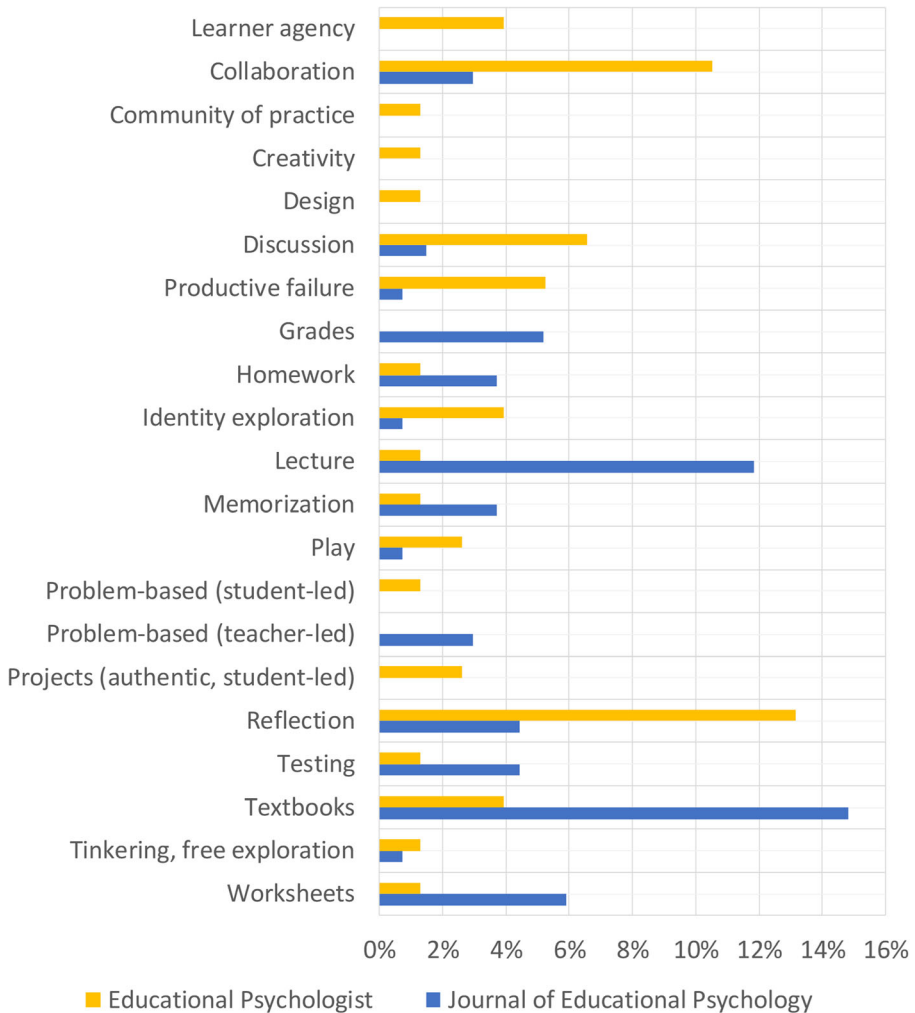Fig. 5 Orientations within each conceptualization of learning

Fig. 6 Practices endorsed frequently in each journal

Discussion of the Illustrative Cases

The illustrative cases suggest that the *transfer/acquisition* conceptualization of learning is indeed the dominant metaphor as suggested by Hager and Hodkinson (2009), Bruner (1996), Kincheloe and Steinberg (1998), Papert and Harel (1991), and Paulo Freire (1970/2005) and that there is evidence for this claim when analysis focuses on the individual person and when it focuses on larger social frames such as educational psychology. Furthermore, these findings suggest that education policy both reflects and perpetuates the *transfer/acquisition* conceptualization of learning. Current education policy as exemplified by the ESSA marks a continuation of the *transfer/acquisition* conceptualization of learning, which is reflected in public perceptions of learning. The *transfer/acquisition* conceptualization of learning is the dominant public perception of learning, and the vast majority of the public has not adopted the *construction/becoming* conceptualization upon which much educational psychology, learning sciences, and critical theory research is grounded.

Educational Psychology Research, Critical Pedagogy, and Conceptualizations of Learning

We began this paper with the observation that there has been a long and rich history of educational researchers calling for dramatic change in the way we think about education, changes which have generally gone unrealized. From Dewey's (1897) call for education to become the site of social reconstruction, through Vygotsky's (1934/1986) and Bruner's (1986) call for constructivist approaches, and the call by Freire (1970/2005), Kincheloe et al. (1999), and Giroux (2001) for emancipatory critical pedagogy, the *construction/becoming* conceptualization of learning has been a foundational assumption.

Tyack and Cuban (1995) argued that the common-sense view of education—the grammar of schooling—explains the resistance to change in the educational system. Collins and Halverson (2010) suggested that we are on the cusp of a radical transformation of education due to the power of digital technologies. Yet the signs of this transformation impacting educational structures, beliefs, and daily practices in educational settings are overwhelmed by indications of the entrenched status of the *transfer/acquisition* conceptualization of learning (Apple 2014; Giroux 2013).

We put forward the proposition that another possible explanation for the lack of change is that practices in teaching and learning based on literature grounded in the *construction/ becoming* conceptualization of learning may have been fundamentally altered when interpreted through the lens of the *transfer/acquisition* conceptualization. We believe that in order for the vision of change put forth by researchers grounded in the *construction/becoming* conceptualization to impact education, the change must be accompanied by a shift among educators, policy makers, learners, and in the broader society away from the *transfer/acquisition* conceptualization of learning.

Kincheloe (2003) argued that teaching practices grounded in the *construction/becoming* conceptualization of learning are incompatible with the *transfer/acquisition* conceptualization. Freire (1970/2005) insisted that: "Those truly committed to liberation must reject the banking concept in its entirety" (p. 79). These arguments suggest a claim (which is in need of empirical research support) that there is a fundamental incommensurability between the *construction* and *transfer/acquisition* conceptualizations of learning. If true, this would suggest that widespread changes in teaching and learning in educational, workplace, and informal learning contexts can only occur through widespread changes in conceptualizations of learning. In the same vein, critical race theorists disrupt, expose, and challenge racist polices, practices, and conceptualizations of learning that disenfranchise marginalized groups (Bell 1980; Ladson-Billings and Tate 1995; Milner 2008) by centering the analysis of how power, race, and racism impact social structures and discourses by maintaining the status quo (Vaught and Castagno 2008; Yosso 2005). In this regard, the status quo is often maintained through conceptualizations that support Whiteness as property and normative ways of knowing and being (Harris 1993). Lakoff and Johnson (1980) suggested that facilitating metaphor shift is possible. Metaphors and analogies contribute to the formation of conceptualizations which open up certain pathways of thought and close down others. They shape our arguments and conclusions by determining the "reality" and "truth" upon which we base them (Hofstadter and Sander 2013). Conceptualizations are not merely a function of language. They dictate our actions as well. A person who believes that knowledge is objectively verified descriptions of reality will engage in very different practices than a person who believes that knowledge is collectively, collaboratively, and individually constructed (Hofer and Bendixen 2012).

The Iceberg Framework for Conceptualization Analysis is limited in several ways. Even though it uses quantitative analysis after initial coding, due to the qualitative nature of the data and initial coding procedures, findings cannot be generalized. Furthermore, it frames conceptualizations as distributed and situated phenomena and therefore has limited potential for application relating to cognitive psychology at the individual level. However, it opens new perspectives for understanding conceptualizations, and from this perspective, we argue that there is a need for more research analyzing the nature, grounding, and impacts of conceptualizations of learning. Much of the literature describing the dominance of the *transfer/acquisition* conceptualization of learning is theoretical or philosophical in nature, and empirical research, although growing (e.g., Arcimaviciene 2015; Arcimaviciene and Jonaitiene 2015; Bialostok 2002, 2008, 2014; Cortazzi and Jin 1999), is relatively scarce. We hope that the framework provides a tentative theoretical, conceptual, and methodological structure through which to invigorate new research. Future educational psychology research could apply the framework in various contexts and domains to identify weaknesses and propose modifications to the framework. Additional analytical procedures may also be valuable, particularly if they can produce a mixed-methods approach. Furthermore, research is needed to integrate complex dynamic systems approaches from other domains (Yoon 2018) to strengthen the modeling of conceptualizations as complex systems. Such research is important for several reasons. First, if administrators, politicians, and those with power over curricular decisions hold the *transfer/ acquisition* conceptualization of learning, it is possible that they may see educational psychology research grounded in the *construction/becoming* conceptualization as contributing little to educational reform or practice (Rowe and Brass 2008). Second, such research would provide explanations regarding how theoretical frameworks, research findings, and evidence-based practices produced by educational psychologists with the *construction/becoming* conceptualization of learning can be misinterpreted and misapplied by researchers, educators, and policymakers with *transfer/acquisition* conceptualizations of learning (Giroux 2001; Goatly 2007). For instance, if such research suggests that powerful learning occurs when structured through collaborative problem solving, educators may unsuccessfully attempt to integrate collaborative activities into their classes, not realizing that intrinsic motivation through learner agency is an underlying assumption held by the original researchers to be crucial. Third, analysis of the conceptualizations of learning in educational psychology research may reveal insights into strategies for researchers in explicitly describing their conceptualizations of learning. Bringing to the surface all of the assumptions inherent to their conceptualizations of learning and communicating them effectively may be just as important as their research findings. Finally, future research can inform development of principles for design solutions which engage educators, learners, and society in conceptual shift regarding conceptualizations of learning—a shift which may be needed to pave the way for facilitating learners' development as empowered producers of knowledge and critical change agents for social justice.

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