From second/third-person education monodisciplines to first-person educational science: An integrating disciplines perspective

ABSTRACT

Why is the field of education divided into many incommensurable monodisciplines? Why does the science of education continue to lag behind the art of educational practice? Why does school learning not transfer readily to life outside the school? This paper proposes that (a) the traditional 2nd/3rd-person infrastructure of today's education is a major contributor to these problems, (b) integrating the traditional 2nd/3rd-person monodisciplines into a unified field of educational science and practice is a prerequisite for eliminating the gaps between research and practice, teaching and application, and learning and transfer, and (c) 1st-person education derived from biofunctional science is a promising conceptual framework for integrating disciplines into a unified science of educational practice.

Key words: Educational infrastructure, educational reform, interdisciplinary education, knowledge, incommensurability, understanding, revelation, insight.

INTRODUCTION

Today's education consists of a large number of individually encapsulated disciplines taking crucial space away from what could otherwise be a coherent field with a unified infrastructure (Schön, 1983). In this article, we explore the possibility that this is, in part, because today's education is, by definition, a 2nd/3rd-person undertaking. Learners, as well as educators, assume that learning is the transfer of someone else's specialized knowledge to the learner; at the expense of the learner's own understanding, something that learners need inescapably in order to be able to integrate their lived experiences of the inside and the outside of the school. This someone-else source of the specialized knowledge can be the teacher, the scientist, or the educator in general.

Our goal is to show how the learner's focus on someone else's specialized knowledge turns the learner's academic lived experience as well as the collective lived experience of the discipline as a whole, into a counterproductive fragment unconnected to the lived experience of the same learners in the real world. To make the point clear, the lens of pronominalization in natural languages is used to engage the personal infrastructure that ties all persons together. In other words, the total set of personal pronouns employed by a natural language (I, you, she, he, ...) is necessary for communication in a given language to work. One cannot arbitrarily use some and exclude others. Yet, this is exactly what today's 2nd/3rd-person education seems to be doing by excluding the crucial 1st-person sources that contribute to human understanding from the definition of education altogether (Iran-Nejad et al., 2009). Our second goal in this article is to argue that 1st-person education, and not the 2nd/3rd-person education, should be the hub of all educational research and practice activities.

Iran-Nejad and Stewart (2010) defined 1st-person education as the learner-sponsored acquisition of knowledge through insight, a process fundamentally different from how knowledge acquisition is conceptualized.
in today’s 2\textsuperscript{nd}/3\textsuperscript{rd}-person education. Although essential, 2\textsuperscript{nd}/3\textsuperscript{rd}-person sources of learning represent only a portion of the fundamental infrastructure for interpersonal relations; and they can only play their role through the 1\textsuperscript{st}-person education sources of human understanding. However, in today’s version of the 2\textsuperscript{nd}/3\textsuperscript{rd}-person education, the all-important 1\textsuperscript{st}-person sources of understanding tend to be overlooked or even repressed.

It is not by accident that fundamental relations among human individuals are captured and signified in language in the form of personal pronouns. As such, through the eyes of the learner, the “someone else” sources of knowledge in education are denoted and used in language in the form of pronouns like you, s/he, him/her, they, or them. The 2\textsuperscript{nd}/3\textsuperscript{rd}-person education formula does not include such original sources of knowledge as I, me, we, and us. As a result, the 2\textsuperscript{nd}/3\textsuperscript{rd}-person education creates an unhealthy you-versus-them atmosphere between learners and educators (Gikara et al., 2011).

The central theme of this article is to show how 1\textsuperscript{st}-person education is the hub through which 2\textsuperscript{nd}/3\textsuperscript{rd}-person education sources must contribute to human learning and understanding. We argue that the deep gaps in the existing educational infrastructure make this impossible. Moreover, given the current infrastructure, such gaps are inevitable in part because the contributing sources to the natural process of education spread across incommensurable monodisciplines. Today’s education, therefore, has a fragmented infrastructure with unfilled gaps as well as overlooked personal relations that preclude authentic commensurability across the areas that make up the broader mission of education. We explain further that, 2\textsuperscript{nd}/3\textsuperscript{rd}-person education has been all about knowledge. It has been an insurmountable challenge to take learners beyond sheer knowledge acquisition (Bloom, 1984). Finally, 1\textsuperscript{st}-person education, how it is different, and how it can constitute a promising way out of the elusive problems of education will be discussed. The goal is not to eliminate the contribution of 2\textsuperscript{nd}/3\textsuperscript{rd}-person educators to the process of education. Rather, the objective is to show that today’s 2\textsuperscript{nd}/3\textsuperscript{rd}-person infrastructure is outdated and that 1\textsuperscript{st}-person education can redefine the contributions to the educational process of the 2\textsuperscript{nd}/3\textsuperscript{rd}-person educators.

### INCOMMENSURABLE DISCIPLINES

In his book “The structure of scientific revolutions”, Thomas Kuhn (1962) argued that rival scientific paradigms are incommensurable. Like the two schemas for supermarket and restaurant, different paradigms are separated by categorical walls. They are incomparable because no one individual scientist can hold them in mind simultaneously just as no one can be in a supermarket and a restaurant at the same time. Because a supermarket and a restaurant are categorically different, it is a distraction, even if possible, to compare even the most similar items in them. By the same token, it is impossible to understand and compare two rival paradigms point by point. The implication is that in today’s 2\textsuperscript{nd}/3\textsuperscript{rd}-person education, the us-versus-them atmosphere has the potential to place learners and educators in two incommensurable paradigms.

The incommensurability thesis was derived from the wealth of the evidence from the history of science. It is also consistent with the body of the evidence generated by the cognitive load hypothesis advanced by modern information processing theory (Paas et al., 2003, 2004; Sweller, 1988). Nevertheless, in the last decades of his life, Kuhn suggested that scientists can learn to hold rival paradigms in mind simultaneously by striving to step outside the box of their native paradigms and learn new ones. Kuhn used the analogy of becoming bilingual to illustrate the point about the scientist becoming bidisciplined or perhaps even multidisciplined (Chen, 1997).

Kuhn’s refinement of his earlier theory is controversial (Chen, 1997; Sankey, 1998); but controversy aside, the new theory suggests that incommensurability of monolithic paradigms is not the end-all. It is merely a stage in the development of scientific thinking. The scientists might explore alternative disciplines and escape the prison house of incommensurability just as the monolingual speaker of a language might learn a new language and become bilingual. Bound within the narrower territory of their individual scientific theories, the scientists of a large collection of monodisciplines cannot escape incommensurability, just as the monolinguals of the many languages of the world are incapable of understanding, communicating, or comparing their languages unless they first take the longitudinal path toward becoming bilingual or multilingual. Even though it is not possible to develop here, we assume, for the purpose of this article, that scientific revolutionists like Darwin must develop themselves through 1\textsuperscript{st}-person education to be masters of two rival paradigms. They must have an elevated understanding of the old paradigm to have a revolutionary appreciation for the problems that elude that discipline. They must also have a revolutionary understanding of a rival theory to be able to explore unusual solutions to the elusive problems of the old paradigm (Wiggins and McTighe, 2005).

### THE PARADIGM AS A WHOLE-PART FRAMEWORK

#### Acquisition of the 2\textsuperscript{nd}/3\textsuperscript{rd}-person knowledge

A new level of incommensurability emerges from the definition of learning as the acquisition of someone else’s knowledge because two very different paradigms are likely to be involved, the expert teacher’s and the novice learner’s. The process becomes even more complex as internalization of someone else’s knowledge (that is, the learner’s)
understanding. It is difficult to see how this is possible not only because it involves crossing impassable gaps across incommensurable paradigms but also because understanding requires a different process from exchanging part-whole components across incommensurable paradigms (Iran-Nejad et al., 2011; Wiggins and McTighe, 2005, 2008).

Consistent with Kuhn's (1962) theory, there is evidence that rival paradigms (e.g., a supermarket versus a restaurant perspective) cause learners to regard the same string of input differently (Anderson, 1977; Anderson and Pichert, 1978). Interpreted through the lens of 2nd/3rd-person education, in the eyes of the lecturing educator, the task of inputting the information by the learner is likely to appear as manageable as the task of outputting the same by the lecturer, notwithstanding the many years it has taken the teacher to master what now seems like a straightforward sequence of ideas. The learners, on the other hand, are faced, each in his or her own unique way, with a different set of concurrent challenges. They must internalize the 2nd/3rd-person knowledge about which they are expected to know less to make the practice of teaching worthwhile for everyone involved. In doing so, the learner, at any given moment, must travel the information path laid down by someone else on the go. Also, in doing so, s/he must keep working with the disembodied outcomes of someone else's understanding. And, the last but not least challenging, s/he must abide by the expectation of figuring out, or at least writing down in the form of class notes for later, reasonable ways to fit together incessantly forthcoming parts to construct the unknown whole that is more than the sum of the incoming parts, namely, the third paradigm. The parts of, say, the statue being presented carry clues of the whole only if the whole is already known by the learner. This is likely to be the case for the teacher but not for the learner, unless teaching is practically reduced to small talk. The process has been likened to constructing—fitting together (Schurz and Lambert, 1994)—the whole of an unknown dinosaur as its disembodied bone fragments are being handed on the spot a few at a time, a feat that the palaeontologist has taken a lifetime to perfect (Neisser, 1967). At minimum only those who know their dinosaurs very well can fit the disembodied pieces of the puzzle together in this way from one moment to the next. The process works well if and only if one palaeontologist is handing the parts to another. Even a palaeontologist who has never seen anything like the particular dinosaur before is going to require days, if not weeks, months, or years, to put the structure together from bone fragments. For an ordinary non-palaeontologist, who knows nothing about dinosaurs, the puzzle is insurmountable. How can we expect learners, then, to be able to construct something significant about the complex paradigm of a discipline new to them by being handed, in the form of lecture and/or discussion, a long string of knowledge fragments in classroom settings that last for no more than an hour at a time?

How, then, can anyone learn a genuinely new paradigm by means of 2nd/3rd-person education acquisition? The answer suggested by Kuhn's incommensurability theory would be that no one can. Educators and students are caught steadfastly in the grips of their respective monodisciplines. On the one hand, the educator working at the centre of her or his native monodiscipline is already too confined or committed to step supportively outside the box of her or his own monodiscipline and into the rival monodiscipline boxes held by learners for the purpose of scaffolding them in the direction of the native paradigm. Learners, on the other hand, are struggling equally steadfastly inside the boxes of their own developmental monodisciplines at the periphery of the native discipline being taught to read the mind of the educator, at the expense of their own paradigm. Therefore, the process of schooling becomes an ingroup-versus-outgroup (us versus them) dilemma with unknown consequences (Gikara et al., 2011; Gikara et al., 2011).

Then, how do people develop new perspectives, as the evidence from the history of science that Kuhn (1962) marshalled has shown? For example, although Kuhn's theory has been controversial, even his critics acknowledge that his theory has room for the kind of radical "change that occurred in early modern astronomy" (Wray, 2007, p. 62). At minimum, as Wray noted, it is difficult to 'argue that Kuhn does provide us with a principled way to distinguish revolutionary changes from non-revolutionary changes" (p. 62). If it is unclear how the 2nd/3rd-person education makes normal paradigm acquisition possible, how can we explain the development of radical paradigms? The evidence can be explained more readily by assuming that revolutionary scientists are 1st-person sponsors in learning the old paradigm as well as their own radically different paradigms.

The nature and use of knowledge schemas

Kuhn (1962) explained the nature of paradigms by identifying them with knowledge schemas as used in modern information-processing theory (Alba and Hasher, 1983; Bornstein et al., 2005; Iran-Nejad and Winsler, 2000). Most schema theories assume the schema to be a priori-knowledge plan for strategic internalization, classification, and storage of knowledge in long-term memory. By this definition, the schema is an abstract organizer well-suited for the acquisition of 2nd/3rd-person knowledge. There is no question that 2nd/3rd-person education makes learners more knowledgeable (Anderson, 1977; Koltsko-Rivera, 2004; Spiro, 1977). Even so, this leaves some relevant questions unanswered. First, what role does knowledge acquisition play in the development of human understanding? Second, is knowledge acquisition the whole story behind revolutionary change, incommensurability...
across disciplines, understanding, or long-term remembering? There are indications that the quality of the thinking of the revolutionaries like Darwin is different from that of the knowledgeable experts of the time; revolutionaries have a different understanding of the problems and the solutions they must embrace to revolutionize their fields (Iran-Nejad and Gregg, 2011; Prawat, 2000; Wiggins and McTighe, 2005, 2008).

The past half a century has taught us a great deal about knowledge and its acquisition, but next to nothing about understanding, its development, and its status in education (Gardner and Boix-Mansilla, 1994a, 1994b; Prawat, 2000). Modern information processing theory assumes that schema acquisition is a whole<<part connection-automation process of the kind investigated in the classic research of Shiffrin and Schneider (1977) and Schneider and Shiffrin (1977). In this process, schema availability becomes a function of the degree of automaticity of the pattern of whole<<part interconnectivity. From this perspective, automaticity requires extensive maintenance or constructive rehearsal in the course of which element interactivity connections in whole structures are rote learned to the point of having their activation paths run outside the sphere of learner control, that is, without requiring and heeding conscious attention or reflection. Consequently, a person can control schemas holistically without being able to control the tacit elements or the tacit patterns of their interconnectivity. From this perspective schemas are building blocks and automaticity is the ultimate form of understanding (Rumelhart, 1980; Sweller et al., 1998).

Although the original research on automaticity and control was conducted in the 1970s (Kramer et al., 1986; Moss et al., 2009; Schneider and Shiffrin, 1977; Shiffrin and Schneider, 1977), a highly readable educational account may be found in the relatively more recent work of Paas et al. (2003), Paas et al. (2003, 2004), Sweller, (1988) and Sweller and Sweller (2006). According to the theory, a well-known feature of the constructive strategies that must be consciously applied to new element interactivity connections is that they are highly resource intensive. By evolutionary design (Paas et al., 2003), cognitive architecture can consciously control a small number (+/-7) of task elements for a short duration of only a few seconds—hence, the related concepts of short-term memory and cognitive load (Atkinson and Shiffrin, 1968; Miller, 1956). Therefore, the notion that a schema is an automated unit of understanding implies that, at any given time, a person's understanding is confined to the domain-specific building block of an operative schema.

According to the theory, selecting, constructing, and automating element interactivity connections within the whole paradigm of an entire discipline—that is, the development of understanding—is an active and intensely resource consuming undertaking, placing a severely capacity-limited bottleneck on the process of 2nd/3rd-person education (Figure 1). Knowledge-acquisition tasks vary along a continuum in the levels of their element interactivity (Paas et al., 2003). This is the population of whole<<part elements, a cognitive task must ultimately summon to represent a whole schema. A task, like learning the function keys of a photo-editing program, has low

Figure 1. Bottleneck of 2nd/3rd-person knowledge acquisition; a hypothetical, severely-limited capacity channel, implied by the information-processing paradigm, linking the outside world of 2nd/3rd-person knowledge to the permanent memory store inside the learner. The two NARROW (downward) and CHANNEL (upward) arrows squeezing the input line underscore the degree of capacity-limitedness of the learning channel.
element interactivity if it can be conceived wholly in isolation, that is, “without consideration of any other elements” (p. 1). By comparison, adjusting the contrast, tone, or brightness of a photograph is higher in element interactivity to the extent that adjusting some of the elements depends on other elements. This means small sets of a large population of elements involved in a complex task must be learned before the prerequisite level of automatic interactivity is reached that defines the whole population in a domain and a domain-specific schema is constructed. In other words, the "elements of high-element interactivity material can be learned individually, but they cannot be understood until all of the elements and their interactions are processed simultaneously" (p. 1). Therefore, level of element interactivity of a task defines its cognitive load or what makes the task easy or difficult to comprehend.

Another chapter in the 2nd/3rd-person education story is presented schematically in Figure 2, which adds to Figure 1 the all too common dimension of accountability. The learner is accountable for internalizing 2nd/3rd-person tasks, keeping them in long-term memory, and using the borrowed knowledge to pass 2nd/3rd-person education tests. What room is left for the 1st-person contribution by learners themselves in the acquisition of their own knowledge and the development of their own understanding?

INTERIM SUMMARY AND DISCUSSION

We have described today's education as 2nd/3rd-person education because it is focused on teaching the learner someone else's knowledge. Evidence from the history of science as well as from within the field of education shows that 2nd/3rd-person education presents the insurmountable problem of incommensurability between where learners are likely to be in their developmental lived experience and what the educator is likely to require learners to learn. This problem explains the gaps between research and practice, teaching and application, and knowledge acquisition and transfer (Bransford and Schwartz, 1999; Reese, 1999).

It is not the intention here to suggest that the 2nd/3rd-person education is dominating the entire field of education. Clearly, there are movements that qualify to be alternatives to the mainstream tradition, e.g., learner-centered constructivism. Rather, what we mean is that there exists a Kuhnian paradigm, as well as a well-established infrastructure, that may be described as 2nd/3rd-person education (Figures 1 and 2) that (a) casts its uniform shadow over the field, (b) is the source of disparity between educators and their students, and, as a result, (c) is responsible for many of the problems that have proven insurmountable over the years. The arguments in this article also raise questions that are beyond its scope. Is there a true version of constructivism or learner-centeredness that is different in fundamental assumptions from the 2nd/3rd-person education movement? Where is the place of other movements like critical pedagogy? Is it possible to show that even such leading constructivists as Piaget shared fundamental assumptions with 2nd/3rd-person education?

FIRST-PERSON EDUCATION

A matter of knowledge or understanding

Is scientific change, revolutionary or not, a change in a scientist's knowledge or understanding? Is the incommensurability between a scientist's alternative paradigm and the discipline's native paradigm a function of human
knowledge or understanding? Is a scientist’s discovery of an alternative to a native discipline’s paradigm first and foremost a change in knowledge or understanding?

Do answers to these and similar questions have significant implications for the theory and practice of education? For example, are the teaching paradigms of the 2nd/3rd-person educators different enough from the learning paradigms of their students to support the incommensurability thesis?

One reason questions like these have seldom been asked during the five decades since the publication of the Kuhn (1962) volume has to do with the widespread assumption that knowledge and understanding are fundamentally the same human capacities, with understanding being a more sophisticated form of knowing. This notion has been formalized by Schurz and Lambert (1994) who stated that “to understand a phenomenon P is to know how P fits into one’s background knowledge” (p. 66). However, there are indications that point to the contrary. Rather than understanding being definable as the fitting of a phenomenon into a disembodied prior knowledge corpus, knowledge acquisition may be defined as the rising of an idea out of a person’s embodied lived experience in the form of an insight (Hsieh et al., 2011; Iran-Nejad, 2000).

This alternative lens for looking at the relationship between knowing and understanding brings a new kind of clarity to the number of areas (Iran-Nejad and Gregg, 2011; Iran-Nejad and Stewart, 2010). First, it makes clear why the knowledge resulting from a scientist’s understanding is unlikely to be a source of incommensurability with the old paradigm. The understanding out of which the new knowledge arises might continue to be. Knowledge is a public communication tool between the first person and second/third persons; it is a social tool for informing others and being informed by them. By contrast, understanding is a 1st-person undertaking. For example, the invention of the light bulb was a consequence of Edison’s lifelong understanding and endeavor. However, after he made public his newly discovered knowledge of the light bulb, that knowledge rapidly became common knowledge, enough to mass produce the bulb. The understanding out of which Edison gained the knowledge of the light bulb may continue to this day to evade people in the sense that if an individual were, for some unknown reason, to reinvent the light bulb all over again, that individual might have to break some of the original barriers of incommensurability all over again. The alternative perspective promises to also take out some of the naïveté associated with the theory of scientific revolutions. For example, it is often stated that scientific revolutions are imported to a discipline from outside. In reality, the discoverer of an alternative discipline must bring to bear an even deeper appreciation of a native discipline and its limitations than its practitioners to be able to come up with a new and more advanced alternative to it (Wiggins and McTighe, 2005).

Education for understanding and knowledge compared

Figure 3, (see Iran-Nejad, 1994, Figure 1) contrasts 2nd/3rd-person education (bottom panel) with a 1st-person education alternative (top panel) in search of solutions to the interrelated problems of educator-learner incommensurability and integrating disciplines. The cone at the bottom shows education for 2nd/3rd-person knowledge acquisition. Learners are assumed to begin with no domain-specific 2nd/3rd-person or 1st-person knowledge at the tip of the cone on the left and accumulate 2nd/3rd person knowledge over time toward becoming an expert in the existing body of prior knowledge of a monodiscipline. The process of knowledge acquisition is internalization of external information by paying conscious attention selectively to important elements of the input, rehearsing strategically those elements, the connections among them, and the connections between them and prior knowledge schemas stored in long-term memory. As already discussed, this process is severely capacity limited and cognitive-load producing every step of the way (Figures 1 and 2).

Learners are expected to pay selective attention to every element of the 2nd/3rd-person knowledge that a new educational task defines for them and to every element interactivity pattern in the task that demands conscious attention. As schematically represented by the gradual thickening in the cone in Figure 3, learners negotiate the problem of cognitive load as they persist in maintenance or constructive rehearsal in every population of elements that a given cognitive task must ultimately summon to form a new automatic schema. The domain-specific schemas are stored in as pre-made structures in long-term memory to be used later as pre-fabricated building blocks for classifying 2nd/3rd-person knowledge and remembering it on tests, or for internalization of further concrete knowledge. Since every element, interaction, and strategy requires conscious attention, the process of the acquisition of automatic schemas is highly time and resource consuming (Figures 1 and 2).

Understanding a 2nd/3rd-person task from this perspective amounts to fitting the task strategically in the learner’s growing prior knowledge network. The learner may ask what is the domain-specific schema in which such and such task’s understanding may fit well (Schurz and Lambert, 1994)? Such a question starts the search for a pre-made schema in the taxonomic corpus that, if found, can culminate in the understanding of the task. With enough 2nd/3rd-person tasks routed this way to various locations in the taxonomic hierarchy of prior knowledge corpus, learners must negotiate their progress slowly through introductory, intermediate, and advanced levels of expertise predefined by 2nd/3rd-person educators (Bloom, 1984; Bloom et al., 1956). Once at the advanced level of the discipline’s perspective, all the scientist has to do is to keep up with or add to the taxonomic changes in the corpus of the discipline.
The picture in the top panel of Figure 3 represents education for the development of 1st-person understanding. The body of the arrow represents the biological person’s ongoing lived experiences. Far from abstract textbook or lecture content, lived experiences are embodied experiences (Merleau-Ponty, 1962). As Prawat (2000) has argued in some detail, embodiment cannot be defined in terms of the taxonomic categories of the external/internal world because such a definition leaves out the crucial link with understanding, which we have argued to be the special (and unique) function of the nervous system in the same sense as breathing is a special function of the respiratory system (Iran-Nejad, 1980; Iran-Nejad and Gregg, 2011). According to Iran-Nejad and Gregg, both understanding and breathing are biofunctional in origin, that is, they result from biological activity. No taxonomic segments can bypass the biofunctional bridge to understanding and still be understood because there is no other route to understanding, just as no one can take oxygen in through the eyes and ears. Biofunctional activity produces taxonomic or categorical concepts in the form of insights (Prawat, 2000), in a manner similar, by analogy, to how the respiratory system produces the body temperature that we can eventually read on the thermometer.

The globes in the rod in the upper panel of Figure 3 represent wholetheme or all encompassing—reorganizations that occur periodically in the form of major revelations (or insights) in the lived experience as the person travels the longitudinal journey of the lifespan. We may not notice when subtle reorganizations occur until an eventual insight announces the click of understanding just as we may not notice the subtle changes in our body temperature until we begin to see the sweat from a full-blown fever. Wholetheme reorganizations make their revealing/insightful occurrence known to the person with a highly striking click of 1st-person understandings. The color

Figure 3. A wholetheme organizer for two approaches to educational practice. Based on A. Iran-Nejad (1994). The global coherence context in educational practice: a comparison of piecemeal and whole-theme approaches to learning and teaching. Research in the Schools, 1(1), 63-76.
difference from one globe to another signifies that, with every highly striking click of new understanding, the subsequently ongoing wholetheme is a qualitatively different understanding, a new lens of a different perspective. Ordinarily, in between the globes, clicks of understanding may be heard with varying degrees of strikingness/loudness. These minor revelations constitute minor adjustments to the ongoing wholetheme understanding (Iran-Nejad, 1994). When the reorganization—as well as the subjective experience—is wholetheme, it encompasses the lived experience in its unbound (that is, nontaxonomic, nonsegmental) totality (Iran-Nejad and Gregg, 2011), just as the body temperature is nonsegmental before it is registered or categorized, so to speak, in the form of a number on the thermometer. Every episode of genuinely significant learning is, more or less, a reorganization of the person’s lived experience.

**Knowledge and embodied understanding**

We can go back now to Figures 1 and 2 and discuss the alternative 1st-person education way of looking at the narrow channel of 2nd/3rd-person knowledge acquisition. The first point to be made is that this channel is not the capacity-limited bottleneck on genuine knowledge acquisition, as it is commonly described to be. Rather, it is an evolution-tested channel with a special function for which it performs reasonably well: social communication. Evolution has sculpted the biological system involved to enable the individual communicator to inform others or be informed by them. The system works well in the context of the 1st-person lived experiences when the need for informing or being informed arises naturally to make (often trivial, as far as new learning is concerned) readjustments in the content of the person’s lived experience.

Describing as a severely capacity-limited bottleneck the communication system whose natural function for the communicator is informing and being informed is in all likelihood a mischaracterization. The 2nd/3rd-person channel does have one limitation. It works sequentially by the necessity of social communication and to the extent that the communicator can presuppose fellow-communicator understanding. It creates the illusion of being capacity-limited because it is sequential by nature. Its function, in and of itself, is not to serve the cause of understanding in the absence of understanding. To use the system for the purpose of promoting human understanding outside the realm of embodied lived experiences is misguided and likely to be even similar, by analogy, to describing how one might shove oxygen through someone’s ears to help the breathing. This includes whether it occurs in decontextualized settings in the laboratory, school classrooms, or elsewhere. Therefore, the 2nd/3rd-person communication system is not as ideal an educational tool for scaffolding understanding as today’s education assumes it is because, at minimum, it is highly prone to the insurmountable problem of incommensurability, just as breathing through the ear is incommensurable with breathing through the nose.

**Illustrating the path from uncertainty to understanding**

Does understanding originate in the schema-driven process of interacting with the 2nd/3rd-person input or in the 1st-person uncertainty that is triggered in the absence of prior knowledge? This section focuses on clarifying this question. The first illustration is more like a simulation than a real example. Consider the statement. “The haystack was important because the cloth ripped”. As the title of their article suggests, Auble et al. (1979) are the only researchers we have found so far in the literature who have addressed the question posed here directly using statements like the one just presented. Reading statements like this creates a state of uncertainty (or as the authors said incomprehension) that triggers the biofunctional process of uncertainty-to-revelation vigilance in people. For this statement, the revelation comes when subjects are presented with the clue parachute after the statement.

The second illustration is a story of a fire fighter named Wag Dodge who survived a fire in which 13 other fire fighters died (Lehrer, 2008). According to the 1949 story, Wag and other members of his crew found themselves caught between a wall of an approaching fire too close and too rapid to escape and a mountain. In this state of high uncertainty, Dodge began, like everyone in his group, the obviously no-win escape strategy. Then, in the midst of the uncertainty of the desperate lived experience he was in, he looked over his shoulder at what the wall of fire behind was doing to the bushes and probably observed the clue that gave him the narrow escape that saved his life. In a flash of an insight, he took the road never taken before: fighting the raging fire by starting another fire. He set fire to the foliage in front of him. Then, as the new fire he set cleared the foliage in front of him, he found a safe place in its wake and dropped face down on the still burning ambers. There, he waits as the big fire arrives and, finding no foliage to consume with him, passes over his body leaving him unharmed. A revelation born out of the uncertainty of what to do had saved his life. Later, Wag Dodge could not explain what gave him the idea of what he had done except for saying that it had seemed like the obvious thing to do.

A third illustration comes from Piaget (1954) and is an amazing example of the deep roots of the 2nd/3rd-person learning in its broadest sense of the term, even in the context of Piaget’s developmental theory. Piaget has demonstrated with his object disappearance methodology that around 4 months of age if the object that the infant is looking at with interest is made to disappear the infant continues to stare at the place where the object has disappeared. Piaget made a 2nd/3rd-person type assumption
to explain this. He assumed that knowledge is the gateway to understanding and explained the infant behavior in terms of what he called a passive expectation hypothesis. He argued that the infant was using the crude knowledge in the expectation to wait passively for the object to return. It was this knowledge, he reasoned, that created the hope for the reappearance of the object. The passive expectation theory attributes a rather complex line of psychological understanding that the 4 month old infant is unlikely to go through. Alternatively, the infant only appears to stare at the place of the absent object because its biofunctional understanding processes are caught in the grips of the uncertainty created by the disappearance of the object and that this uncertainty clears the way to the eventual understanding tacitly or in the form of a revelation that present objects can disappear out of sight, which is an important, previously-unentertained, stage in children's understanding of object permanence.

The fourth example illustrates that, in 2nd/3rd-person education, performance assessment runs the center stage; and performance learning—that is, of the kind that is unencumbered by performance assessment—is generally absent. In 1st-person education, the opposite must be the case. First-person performance learning must occupy the center stage entirely unencumbered by performance assessment that must remain fully inconspicuous in the performance learning process. This can be accomplished in many ways. The 2nd/3rd-person performance assessment evaluator may stay completely out of the picture of performance learning activities as much as they possibly can. More generally, with a more dedicated shift toward 1st-person education, educators and learners can find inventive ways to collaborate to push performance assessment out of the visible picture of performance learning. First-person education implies that the situation must be reversed by keeping performance assessment inconspicuous, which is admittedly next to impossible in today's education.

We have struggled with this problem in designing 1st-person education graduate courses in the past two decades. Our experience indicates that certain things can be done reasonably well even in today's 2nd/3rd-person-education settings. For example, learners may be encouraged repeatedly throughout the course to push performance assessment out of the picture of their performance learning activities as much as they possibly can. More generally, with a more dedicated shift toward 1st-person education, educators and learners can find inventive ways to collaborate to push performance assessment out of the visible picture of performance learning.

To illustrate, Table 1 shows a performance-learning-visible-performance-assessment-hidden activity we have used with relative success with both undergraduate and graduate courses for education majors. A 1st-person education syllabus encourages learners to keep a running list of their insights/revelations for a given learning module. Then, at a reasonable juncture such as toward the end of the module/week, they select to feature their most striking revelation (MSR), state that MSR in a simple sentence (12 words max), and write a concise paragraph around 120 words (max) to try to reflect on the MSR for the purpose of understanding it more fully—understanding by reflection (UBR). To fan the fire of further uncertainty after the MSR-UBR composition has already been articulated, students also pose their most burning question(s), hence, MSR-UBR-Qs. The purpose of this exercise is to increase the frequency of the learner's 1st-person revelations in the course of the semester and put the students on the path of

<table>
<thead>
<tr>
<th>MSR: Most striking revelation.</th>
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<tbody>
<tr>
<td>UBR: Understand by reflection</td>
</tr>
<tr>
<td>Q: Follow-up question part of the exercise (not shown in Table)</td>
</tr>
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</table>

Table 1. An uncertainty-to-revelation learning activity that is simultaneously a 1st-person performance learning exercise as well as an eventual performance assessment tool. This exercise seems to work relatively well for keeping performance learning in the plain view of the learner/author and performance assessment hidden by postponing the thought about its use by a 2nd/3rd-person performance evaluator.
1st-person learning (Table 1).

From the perspective of performance learning, the learning activity sampled in Table 1 seems to have caused the wholetheme reorganization in understanding that it was designed to do. Initially, exposure to the “assignment” had seemed a complete waste of time. By the time of this particular insight, revelations had reached the status of making life rewarding. Progress of this magnitude is probably rare in 2nd/3rd-person education. The guidelines in the syllabus and further follow up concentrated on freeing learners of the burden of accountability at the moment of learning. In the current 2nd/3rd-person education infrastructure, this is not an easy task. Initially, students expressed (self) doubt about successful separation of performance-learning and performance-assessment roles. Slowly a new understanding started to develop for some sooner than the others. The composition in Table 1 carries no trace of the initial doubt. For example, there is no indication that the author was hampered by the knowledge that this product would be used later toward assigning the course grade. Therefore, the product in Table 1, reveals no indication that the guidelines to hide performance assessment have been unsuccessful or have adversely affected the quality of the work. Given the goal of 1st-person education, as shown in Figure 3, the product seems to carry almost flawless validity. Finally, as a further illustration, it is noteworthy that the closest today’s 2nd/3rd-person education ever gets to performance learning projects that potentially hide performance assessment at the moment of the learner’s engagement in performance learning are graduate theses and dissertations.

CONCLUSION

Today’s field of education consists of a large number of space-capsule disciplines insulated securely with walls of incommensurability. These boundaries make integration or even cross-disciplinary collaboration impossible. We believe this has a lot to do with educators thinking too much about what they are or should be doing as educators and too little about what the learners are capable of doing as learners. We have argued in this article that the source of the problem is a deep-seated 2nd/3rd-person education inclination that not only separates disciplines from one another but also educators from the learners they aspire to teach. This is because 2nd/3rd-person education is inconsistent with the inherent nature of human development, learning, and understanding.

The concept of 2nd/3rd-person education is used because it compares with 1st-person education, the broad outline for which we have drawn here along with some specific illustrations of some of its immediate aspects. We believe this approach promises to be helpful toward eliminating many of the sources of incommensurability. Perhaps the most persistent source of incommensurability is the focus in educational disciplines on 2nd/3rd-person knowledge acquisition. We must consider the possibility that this focus is inherently flawed in that it encourages educators and learners to concentrate on seeking and working on taxonomies (Shulman, 1986, 2002), a process that breeds widespread incommensurability. First-person education promises to help by concentrating on understanding through encouraging learners to seek 1st-person revelations and reflect on them (Iran-Nejad and Stewart, 2010).

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