International Journal of Educational Psychology

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Date of publication: October 24th, 2015
Edition period: October 2015 - February 2016

To cite this article: Iran-Nejad, A.; Stewart, W. & Robinson C. (2015). First-Person Educational Psychology for Teacher Education: A Biofunctional Understanding Intervention. *International Journal of Educational Psychology*, *4*(3), 252-279. doi: 10.17583/ijep.2015.896

To link this article: http://dx.doi.org/10.17583/ijep.2015.896

IJEP – International Journal of Educational Psychology, Vol. 4 No. 3 October 2015 pp. 252-279

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Abstract

This is a semester-long study of the development of first-person biofunctional understanding in educational psychology for teacher education majors. We defined biofunctional understanding as a spontaneous intellectual capacity. To reach its deep biological levels, sculpted by countless evolutionary millennia, students identified and dwelled in writing on their biggest idea of every week for a semester. They stated the idea in a simple sentence and followed by writing a concise paragraph to contemplate on it. Control sections equated their biggest idea with one most important to learn through the conventional learning-testing cycle of deliberate knowledge internalization or construction. Experimental sections fought the learning-testing-cycle urge and sought by hindsight the biggest idea of the most striking revelation (MSR) delivered to their awareness spontaneously by the biofunctional<>psychologyical spiral of their intuition>revelation<>reflection cycle. Results showed that experimental condition outperformed the control in the development of their insightful understanding measured by a Levels of Revelatory Strikingness Scale (LRSS) suggesting that learners change their understanding as a function of their 1st-person revelations than 2nd/3rd-person evidence.

Keywords: intuition>revelation<>reflection spiral, first-person education, biofunctional understanding, insight, embodiment

ISSN: 2014-3591
DOI: 10.17583/ijep.2015.896

IJEP – International Journal of Educational Psychology, Vol. 4 No. 3 October 2015 pp. 252-279

Psicología de le Educación en Primera Persona para la Formación del Profesorado: una Intervención Biofuncional

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Resumen

Usando cuatro secciones de un curso de grado de psicología de la educación con educación deliberada, se estudió en a posteriori el cambio no deliberado en el desarrollo de la comprensión biofuncional sobre sí mismos. Definimos la comprensión biofuncional como una capacidad intelectual espontánea; y para llegar a sus niveles biológicos profundamente arraigados, esculpidos por milenios de evolución, todos los estudiantes escribieron su principal idea acerca de ello cada semana durante un semestre. Las secciones de control equipararon su mayor idea con lo que ellos consideraron que era lo más importante a aprender a través del ciclo convencional de aprendizaje-evaluación en la internalización o construcción del conocimiento deliberado. Se animó a las secciones experimentales a combatir el ciclo de aprendizaje evaluación y a buscar a posteriori la idea esencial o mayor sorprendente revelación (MSR) consciente e involuntaria en la espiral biofuncional <> psicológica en su ciclo de intuición>revelación<>reflexión. Los resultados mostraron que las secciones experimentales superaron secciones de control en el desarrollo de su comprensión perspicaz medida por la Levels of Revelatory Strikingness Scale (EBLR). Llegamos a la conclusión de que los estudiantes son más propensos a cambiar su comprensión en función de sus propias revelaciones en primera-persona revelaciones que en respuesta a las evidencias en segunda/tercera persona presentadas por otros.

Palabras clave: intuición>revelación<>reflexión espiral, educación en primera persona, comprensión biofuncional, conocimiento, personificación.

ISSN: 2014-3591
DOI: 10.17583/ijep.2015.896

Decades of interdisciplinary research have illuminated the processes that contribute to human psychological and biofunctional learning and understanding (Barrett & Satpute, 2013; Gendron & Barrett, 2009; Iran-Nejad, 1980/1987). Psychological learning and understanding processes lean on the side of mindful deliberation, active attention, effortful knowledge internalization or construction, symbolic content, informing others or being informed by them, and are relatively recent on the evolutionary scale. Biofunctional learning and understanding infuse intimately with affect (Holbrook, Sousa, & Haun-Holbrook, 2011), are the immediate source of nonsymbolic (or phenomenal) content, reveal their outcomes in the form of insight (or revelation), cannot readily inform or be informed by others, and are ancient on an evolutionary scale (Greene & Haidt, 2002; Iran-Nejad, 2015; Remmers, Topolinski, & Michalak, 2014).
For the purpose of this study, we assume that when nondeliberate biofunctional and deliberate psychological sources of understanding integrate versus associate (hereafter represented, respectively, as <> versus – for short), interlevel biofunctional<>psychological perspectives are born (Wimsatt, 1976). According to McCauley (1986), interlevel theories are capable of exploiting "the descriptive and explanatory resources of theories from more than one level of analysis" (p. 196). On the psychological side of this integration (<>) as opposed to association (-), the immediate manifestation of the interlevel spiral is an intuition>revelation<>reflection cycle, in which the first greater than (>) sign implies that intuition is the global coherence context for the revelation<>reflection cycle (Iran-Nejad, 1994).

There is evidence that all-involving performance learning activity (PLA) in this comprehensive cycle is characterized by a paradox of missing functions and that the hidden solutions to this missing function are biofunctional in origin (Iran-Nejad, 2013; Iran-Nejad & Bordbar, 2013). The cycle of the interlevel intuition>revelation<>reflection is paradoxical because understanders may know on the side of psychological (i.e., phenomenal) experience that they get revelations—only with the benefit of hindsight—but they have no idea how; they are clueless about what happens on the side of biological activity (Iran-Nejad, 2013; Iran-Nejad & Bordbar, 2013; Prawat, 2000). Nevertheless, the working assumption behind the

current investigation is that, paradoxical or not, the interlevel biofunctional<>psychological spiral and its experiential intuition>revelation<>reflection cycle offer a more natural foundation for the development of understanding than a purely psychological or biological one (Dunlosky, Rawson, Marsh, Nathan, & Willingham, 2013; Iran-Nejad & Gregg, 2001). This article reports the results of an intervention built inclusively on these ideas and aimed at engaging students in the more encompassing spiral just described, through the lens of education for the development of first-person understanding, hereafter 1st-person education for short.

As conceptualized here, 1st-person education assumes that (a) the learner is the self-sponsored hub of all performance learning activity (PLA) across all internal and external contexts, contents, and systems, (b) the immediate educational focus must be exclusively on performance learning and not at all on performance assessment in its current form, and (c) biofunctional understanding is an inevitable part of the working picture of 1st-person education. In other words, rather than internalizing external content piece by piece under the sequestered authority of 2nd/3rd-person educators (i.e., those other than individual learners themselves), the entire expanse of the triarchic—1st, 2nd, and 3rd-person—infrastructure of personal pronouns gets engaged around the hub of the first person of the learner as the self-sponsored common denominator of all the sources of learning, each serving its most natural role at the interest of the learner. The triarchic infrastructure of personal pronouns is by nature a wholetheme social organizer in the fullest sense of the term (Iran-Nejad, 1994). Even though personal pronouns may vary in symbolic form from one language or culture to another, nonsymbolic real-world and biofunctional embodiment join in the biofunctional<>psychological spiral to involve more or less the same wholetheme infrastructure for all languages and cultures, explicitly or implicitly (Iran-Nejad, 2013). Obviously, in English, these pronouns may be identified unexhaustively as I, we, us, me, mine (1st-person hub), you, yours (2nd-person), and he, she, him, her, they, theirs (3rd-person). The implication is that any experimental manipulation of learner understanding must be more holistic and balanced than today's symbolically-drowned 2nd/3rd-person education can possibly warrant.

A rough outline of the multiple facets and phases of the educational development of the biofunctional<>psychological understanding spiral is presented in Table 1. In putting together this table, we have assumed that the biofunctional<>psychological spiral makes the development of understanding inherently personal for the learner (Iran-Nejad, Stewart, & Parizi, 2009). The working picture portrayed in this table is in general accord with the recent developments in mind-body integration (e.g., Iran-Nejad & Gregg, 2001). It is also in line with the learner-centered movement of recent decades (below). At the same time, it contrasts with the psychological only cycle of learning-testing in which associative learning is defined as deliberate connection internalization of 2nd/3rd-person knowledge and testing is defined accountably by such 2nd/3rd-person authorities as the source of the evidence for the extent to which external knowledge internalization has taken place.

Table 1

Levels of Revelatory Strikingness Scale (LRSS) Showing Multiple Facets and Phases of (Educational) Development of Biofunctional<>Psychological Understand-ing Spiral that Causes Sustains hindsight Intuition>Revelation<>Reflection (Cycle

LRSS Phase	Description	Interpretation based on and beyond the literature	Developmental phases of embodied understanding
0	unrelated, exclude from scale (kept in this study)	no or apparent trial-error evidence for learning	behavior only, no inference possible beyond observable
1	verbatim statement of 2nd/3rd-person knowledge imported from textbook or class notes	deliberate memorization in the learning-testing cycle of verbal knowledge acquisition	intralevel knowledge internalization only with no evidence for understanding
2	restatement in one's own words of 2nd/3rd-person knowledge imported from book or class notes	deliberate engagement or improvisation in the learning-testing cycle of knowledge acquisition	intralevel internalization of a scaffolder's understanding with no notable focus on personal understanding

3	1st-person reproduction of 2nd/3rd-person schemas within the academic scope of a lesson taught	deliberate construction-reflection in the broader context of the cycle of learning-testing	intralevel internalization of scaffolder focal understanding and peripheral concern with personal understanding
4	1st-person production of (1st, 2nd, 3rd-person) insights in the academic scope of a lesson taught	deliberate foresight with possible engagement in hindsight intuition> revelation<>reflection	interlevel biofunctional<> psychological spiral with focal awareness of one's personal (un) understanding
5	1st-person production of (1stperson) insights within the academic scope of a lesson one has never been taught.	deliberate foresight with flexible engagement in hindsight cycle of intuition> revelation <>reflection	interlevel biofunctional<> psychological spiral with problematized awareness of spontaneous psychological (un)understanding
6	multiple-source production of integrating (1st, 2nd, 3rd-person) insights of a thematic scope one has never studied oneself.	deliberate foresight with situated intuitive flexibility and professional technical facility in a creative area of interest	spontaneous biofunctional understanding of paradoxical mutual inclusion functions with no psychosocial mutual exclusion solutions
7	1st-person production of integrating (1st, 2nd, 3rd-person) insights of a wholetheme scope one has never studied before.	deliberate foresight with contextual intuitive flexibility and professional technical artistry beyond a creative area of interest	biofunctional realization that mutual inclusion solutions to the paradoxical nature of understanding are ultimately biofunctional<>psychosocial

Table 1 is also a rough methodological thematic organizer for the study to be reported. In this table, LRSS 0 is defined as unrelated to interlevel integration (<>). LRSS 1 and 2 portray the conventional control level in the study representing deliberate internalization of 2nd/3rd-person knowledge. Understanding at this level amounts to knowledge association, differentiation, and categorization (Bransford & Schwartz, 1999; Brown, 1978; Shulman, 1986) achievable by seeking classification taxonomies for the input and improvising by association (Brown, 1978; Shulman, 2002). LRSS 3 represents the state of the art on the relationship between mindfulness and intuition as discussed by Remmers, Topolinski, and

Michalak (2014). LRSS 4-8, portray, in principle, the experimental level of the study, encompass a steady, but not necessarily linear shift, toward nondeliberate intuition>revelation<>reflection cycle of spontaneous biofunctional understanding achievable through deliberately seeking hindsight revelations and dwelling reflectively on the most striking revelation (MSR) among them.

Internalization of Second/Third-Person Knowledge

A great deal of today's education is associative 2nd/3rd-person instruction aimed at internalizing other people's knowledge. To be sure, 2nd/3rd-person knowledge internalization has a place and much classroom interchange may be carried out in this way; but the process works best in the convenience of conversation-style informing or being informed by others. In fact, convenient conversation is perhaps the most interesting and beneficial manner of 2nd/3rd-person interaction, especially, when it happens to trickle down with ease to spontaneous levels of understanding. However, few people expect casual conversation from education. More often instruction mixes with strict accountability and tends to overtax convenient conversation. Under the pressure of the learning-testing cycle of knowledge internalization and construction, convenient conversation becomes something else (Dunlosky, Rawson, Marsh, Nathan, & Willingham, 2013) even though it is not always easy to determine what. For example, teaching for psychological understanding in the style of the 2nd/3rd-person education may overburden or overplay the bottleneck of steady attention and effort in the course of active chunk-by-chunk associative learning (Atkinson & Shiffrin, 1968; Shiffrin & Schneider, 1977). Engagement may rapidly turn resource-intense and exhausting with insufficient benefit for learners, especially when there are no easy answers to the question of the personal relevance of teaching to the learner.

From time to time, 2nd/3rd-person instruction provides educators with rigorous and reasonably effective heuristics for guiding learners through the process of learning and understanding (Sweller, 1988; Sweller, Van Merrienboer, & Paas, 1998). But such effective heuristics are not prevalent. It is important to think about the range of practical options educational

psychology instructors, for example, have available to take to their teaching beyond the narrow learning-testing cycle of accountability. One popular resource available to university graduate teaching assistants is Bloom's hierarchy of educational objectives. Bloom and collaborators designed their taxonomies as an organizational framework for guiding teachers and learners in the constructionist process of selecting, elaborating associatively, and classifying the ideas in lectures and textbooks (Bloom, Englehart, Furst, Hill, & Krathwohl, 1956; Krathwohl, 2002; Krathwohl, Bloom, & Marois, 1964). In an academic setting, learners select the ideas they think the teacher or the textbook author considers important, elaborate on them based on the connectionist schemas they have learned previously from teachers, and use their schemas to classify the information in their notes. They use constructionist elaboration to build structural links among the elements of the input content and with the knowledge they have previously stored in long-term memory (Mayer, 1980). For this purpose, Bloom's taxonomy included a hierarchical list of active learning techniques for the engagement of learners in deliberate comprehension, analysis, synthesis, application, and evaluation of the input. Relevance of the input to the person of the learner is not among these basic learning techniques.

First-Person Education

A major step toward targeting nondeliberate capacities of learners has been taken in the form of learner-centered education. Although already implied by the concept of active learning in the literature of cognitive psychology, the concept of *learner-centered* education was officially featured in a project sponsored by the American Psychological Association entitled "Learner-centered psychological principles: A framework for school reform and redesign" (American Psychological Association, 1997). The document for this project was drafted in 1991-1992, disseminated in 1993, revised in 1997, and eventually made available at the APA website. The project culled from the psychological research the evidence-based constructs and findings to represent the whole person of the learner, learning context, educational opportunities, and outcomes. The learner-centered project takes a leap forward in facing the previously-insurmountable challenge of assembling a

hitherto-fragmented assortment of psychological constructs for educators to use toward a global coherence context for educational practice (Iran-Nejad, 1994; McCombs, 2001). With the learner being the common denominator in diverse PLA settings, the learner-centered approach offered a promising solution toward a unified approach to classroom learning as a multiple-source undertaking (Table 1).

As another step closer to the biofunctional<>psychological approach, the National Research Council (NRC) published *How people learn: Brain, mind, experience and school* (Bransford, Brown, & Cocking, 2000). This publication, often used as a reader in graduate courses, was a collaborative endeavor among 16 leading researchers aimed at identifying the key findings toward a "new science of learning" for informing the design of pre-K through college learning environments. As another step toward unifying the global coherence context of the research-based educational practice, this eclectic volume is, therefore, a synthesis of several decades of theory and evidence from a wide range of disciplines including cognitive science, psychology, education, anthropology, neuroscience, computer science, and educational technology. The contributors to the volume captured points of convergence to compose "a solid research base … [with] strong implications for how we teach" (2000, p. 14).

Other encouraging developments are linking the research on leaner-centered teaching with the classic person-centered literature of the humanist Carl Rogers (1951, 1959). Represented in these converging developments are person-centered and learner-centered models widely apart in origin (1950s versus 1990s), psychological tradition (motivation versus information theory), and setting (therapeutic versus educational). In the process, systematically deliberate eclecticism of active self-regulation infuses with the dynamically spontaneous global coherence context of educational theory and practice (see Table 1, middle column). As defined by Cornelius-White (2007), the "classical approach emphasizes teacher empathy (understanding), unconditional positive regard (warmth), genuineness (self-awareness), nondirectivity (student-initiated and student-regulated activities) and the encouragement of critical thinking (as opposed to traditional memory emphasis)" (p. 113). In this excerpt, Cornelius-White articulates a convincing case for making the holistic context of global

coherence, diversity in setting and context, and personal relevance a high priority in education

Overall Framework for the Study

As already explained, the present study investigates a new approach to the spontaneous development of 1st-person understanding. The overall hypothesis is that the interlevel under-standing (with a hyphen) biofunctional<>psychological spiral, along with its experiential (by hindsight) intuition>revelation<>reflection cycle, causes deeper 1st-person as well as 2nd/3rd-person understanding than the intralevel learning-testing cycle of today's 2nd/3rd-person education. However, the focus of the present study is on 1st-person understanding beyond 2nd/3rd-person education as practiced today. The two overall frameworks derived from the literature discussed so far in the introduction are shown in Figure 1 and Table 1.

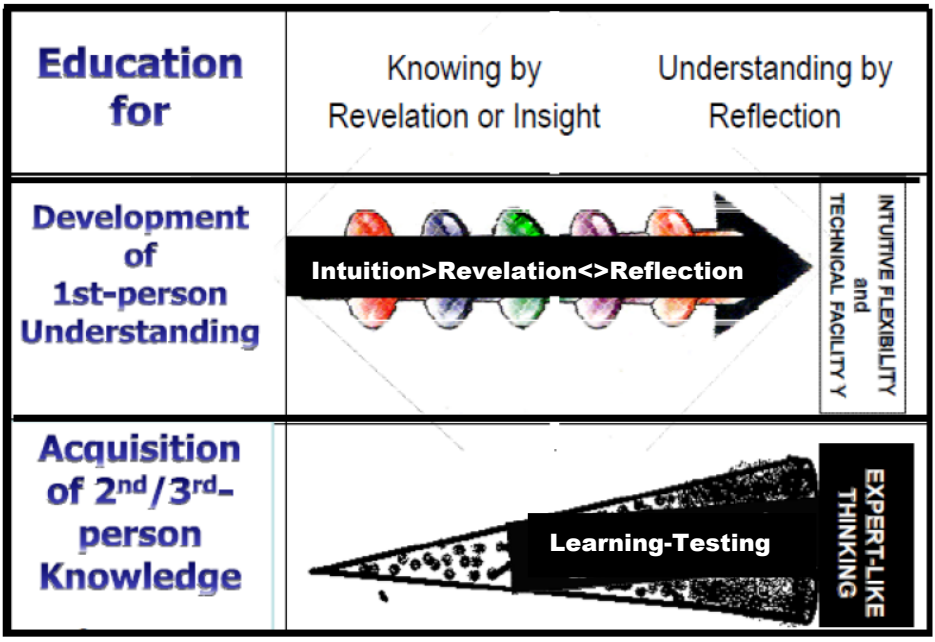

Figure 1. An organizer for wholetheme (top) and piecemeal (bottom) approaches to research and practice. Wholetheme knowing by revelation (spontaneous biofunctional understanding) and understanding by reflection (deliberate psychological understanding by hindsight) only apply to the top panel. The bottom panel, instead, represents piecemeal knowledge internalization by seeking taxonomies and improvising with them, an approach that is inconsistent with the wholetheme perspective (Iran-Nejad, 1994).

The cone at the bottom panel in this figure represents the learning-testing cycle of 2nd/3rd-person knowledge acquisition through classroom instruction from having no specialized knowledge of a given field (tip on the left) to possessing an expert's typical knowledge of the field, say educational psychology. The journey begins with (a) the domain-general or abstract knowledge of the field, or (b) domain-specific exemplars from the immediate environment, or (c) the interactive combination of the two and continues as the learner internalizes the field's 2nd/3rd-person knowledge base under the pedagogical authority of more knowledgeable experts. Therefore, the exterior wall of the cone defines its widest possible interior as the ultimate scope of the learner's psychological understanding within the up-to-the-moment confines of the specialized field of knowledge. LRSS 1-2 levels in Table 1 represent this approach. The extent to which, if any, today's 2nd/3rd-person education engages the spontaneous development of 1st-person understanding has not, to our knowledge, been investigated in the past, hence, the present study for a comparative investigation of the two approaches delineated in Table 1 and Figure 1.

Shulman's (2002) seeking and improvising with knowledge taxonomies is a domain-general learning technique to the extent that it may jumpstart, at the tip of the cone in Figure 1, the teaching and learning of any 2nd/3rd-person education course at any educational level. However, once the journey has begun, with zero prior knowledge of the specialized course, it creates a general-specific bottleneck for a monodisciplinary path of no return within the confines of the exterior wall of the cone in Figure 1. Starting at the no-knowledge tip, learners seek, select, categorize, and internalize main ideas chunk by chunk using domain-specific/general learning-testing strategies such as the keyword mnemonic, underlining, predicting, and

summarizing (Dunlosky et al., 2013; Palinscar & Brown, 1984). As the journey moves from introductory to intermediate to advanced levels of specialization, the resulting general-specific hierarchy becomes more deeply embedded, more elaborate, and increasingly situated as learners continue to make and practice richer, stronger, more invariant, and more automatic connections (a) among important ideas, (b) with previously-accumulated concepts of the academic field, and (c) with their prior knowledge of the world applicable to the specific domain. At every step, the direct scope of learning is psychological understanding defined as deeper differentiation and wider psychological constructionism (Gendron & Barrett, 2009) and measurable by the ability of learners to restate in their own words the given 2nd/3rd-person knowledge without committing plagiary or interjecting false intrusions (see Table 1, LRSS 0-2). The terminal goal is expert-like mastery of 2nd/3rd-person knowledge on a journey licensable with an end diploma of some kind (Figure 1, lower panel).

The biofunctional<>psychological journey that supports 1st-person education is shown with the arrow at the top panel of Figure 1 (see also Table 1). This journey is comprehensive of all domains. The cylinder of the arrow represents up-to-the-moment intuitive (spontaneous biology-created) understanding and the globes on the arrow represent a surge in revelations of varying degrees of strikingness toward insightful reorganizations of people's comprehensive understanding. Expert-like mastery of the content of any specialized course of learning is not a formal-education focus but is replaced with an open-ended intuition>revelation<>reflection journey by hindsight using techniques sponsored and navigated deliberately by learners themselves.

Hindsight Intuition>revelation<>reflection is domain comprehensive and consists of deliberately seeking one's own nondeliberate (biology-given) revelations and, once found, reflecting on them in sustained writing or otherwise. The main reason for the assumptions that intuition and revelations are biology-given is that their arrival into awareness creates a paradox of a psychologically missing function and they come when they are psychologically unexpected (see Table 1, right column, and below). When learners seek personally-embodied revelations, they face the challenge of navigating the open ground of their intuitive understanding. Therefore, they

are more likely to uncover revelations or clicks of understanding that are (a) personally relevant, (b) cover diverse content domains, and (c) follow the path of the understander's creative areas of interest (Feinstein, 2006). A related assumption behind the intuition>revelation<>reflection methodology employed in the present investigation is that sustained reflection (in writing) on one's personal revelations is an effective way not only to foster and hone one's own inventive capacities but also to develop the art of self-understanding.

Method

Participants

Participants were 162 college of education undergraduates. They were made available to researchers via the convenience sampling of their enrolment in four sections of an undergraduate educational psychology course required for teacher education majors. The majority of them were female in the age range of 19-22. They were mostly white with less than 10% from other ethnicities.

Early in the semester participants in all sections were asked to complete an IRB-approved informed consent form requesting them to volunteer to donate their individual course material (exam scores and PLA portfolios) for use in research in the scientific study of learning and teaching. Otherwise, the students in each section experienced what was the normal course of teaching and learning for their sections throughout the semester. To make the relatively large amount of course material more manageable, two additional levels of sampling were embedded in the study. For one sampling, participants were asked to select a subset of 5 of the larger set of their weekly writing PLAs and submit it in the form of a required bonus portfolio at the end of the semester. For the other sampling, course materials for 15 participants within each section were randomly selected for use in the study. Procedural details are presented below.

Teachers

As it is customary in many research universities, the course was taught by graduate teaching assistants (GTAs) under indirect faculty supervision. In this particular semester, three of the participating teachers were GTAs, each

teaching one section. The fourth teacher was a faculty member who taught one of the sections. There was one female GTA and three male teachers. One of the teachers was African American. The other three were white.
Beyond some scheduling constraints, participating teachers were randomly assigned to the four sections of the same undergraduate educational psychology course. One experimental and two control sections were taught by doctoral GTAs. Another experimental section was taught by a faculty member. The three GTAs were nearly equal in the number of years (a) of teaching experience (with the same course) and (b) in the graduate program.

The Intervention

The intervention was a combination of a student-sponsored performance-learning activity (PLA) and the teaching that supported it. As described in the syllabus, the sustained weekly PLA task involved deliberately seeking a self-sponsored set of big ideas per week, selecting the biggest idea of the week from the set, stating it in a simple sentence, and elaborating concisely in an additional paragraph on what made the idea big from an educational standpoint. There was one PLA per week for the sustained duration of the semester.

Beyond these shared guidelines, the students in the control (LRSS 2-3, Table 1) and experimental (LRSS 4-7) sections received different treatments. The core of this treatment consisted of the different ways in which the *biggest-idea PLA* was defined by the section teacher for experimental and control sections; and the crust of the treatment came from the differences in the qualifications of the teachers for experimental and control sections. The goal, at least in principle, was a most natural infusion in practice—by both teachers and students—of this crust-core combination. The criterion of natural infusion was considered paramount because it determined each teacher's definition of the biggest-idea PLA, both in the early-semester introduction to the course and the steady reinforcement of the same for the duration of the entire semester.

The teachers for the two experimental sections defined the biggest-idea PLA according to the intuition>revelation<>reflection cycle; and the teachers for the two control sections applied the learning-testing cycle (see Table 1 and Figure 1 and related text). Beyond the early-semester definition,

any further reinforcement as needed, and the teaching conducted accordingly, participating teachers and students went about their jobs as they saw fit.

More specifically, students in the control condition were expected to (a) work faithfully under the influence of the conventional learning-testing cycle, (b) go after 2nd/3rd-person knowledge, and (c) seek and internalize the big ideas that they considered to be important through the eyes of the classroom teacher, the textbook author, or ultimately the scientist. By comparison, students in the experimental condition were expected to (a) do their best to resist the temptation to work under the influence of the learning-testing cycle, (b) do everything possible to fight the urge to work for the grade, (c) go deliberately after the spontaneous development of their own biofunctional understanding, (d) seek by hindsight their own 1st-person revelations (or spontaneous insights), and (e) given the dynamic correlation between one's own revelations and one's interest (Iran-Nejad & Chissom, 1992), occupy themselves with ideas interesting to them, rather than ideas someone else considered important in the course. To get an idea about the eventual form a weekly PLA might take in the experimental condition, the reader may find it informative to examine the illustration presented in Table 2.

Table 2

An MSRUBR Performance Learning Activity (PLA) by a Graduate Student in a First-Person Education Course. Students Were Encouraged to Seek Their Own Weekly Revelations for a Semester, Select the Most Striking Revelation (MSR) among Them, State It in a Concise Sentence, and Write a Concise Paragraph for further Understanding by Reflection (UBR).

MSR: The threat of originality causes revelations about oneself
UBR: Originality is scary. The reason that individuals are so threatened by originality is the unknown. Originality forces the individual to look inside themselves and find something that no one else has. But how do you know that your thought is different than everyone else's? The answer is confidence in oneself. By having confidence that you are an original creation then you can have confidence that you have the ability to be original. Yet, more importantly the threat or fear of having to be original makes one ask why that is so scary? It IS so scary because it shows that there is a lack of confidence in some aspect of your life. In exporting that aspect individuals can have revelations about their own personality. Personally, the threat of doing this project made me have the revelation that I was scared of not being smart enough. Creative individuals are always seen as intelligent. I was scared that my lack of creativity would show my lack of intelligence. However, upon further exploration within myself I realized that by letting go of my insecurities my originality came easier.

The above was the learning core of the intervention. The teaching crust of the intervention was as important as the learning core. The two GTAs teaching the control sections had no coursework, scholarly background or teaching experience in intuition>revelation<>reflection education. Therefore, their years of classroom learning-testing experience meant that they were qualified naturalistically to instruct their students according to 2nd/3rd-person education. However, these GTAs were coached by their faculty supervisor to test not only for knowledge internalization but also for understanding and application

.

The teachers for the experimental sections were different. The GTA had extensive coursework, collaborative research experience, a thesis, one senior-author journal submission, several junior-author submissions, many conference presentations, and two years of closely supervised teaching in 1st-

person understanding. Given this background, he was expected to be a naturally qualified advocate and practitioner of 1st-person education and of defining the same according the intuition>revelation<>reflection cycle.

The faculty member teaching the second experimental section had had lifelong interest and experience, more than 20 years of graduate teaching experience, about 16 years of GTA supervision, and more than 25 years of research, publications, and presentations on, or closely related to, 1st-person education. This faculty member provided additional teaching supervision for the GTA who taught the other experimental section. Overall, these teaching crust and core learning qualifications were assumed to provide in combination the overall prerequisite context across the control and experimental levels of the target intervention of the study.

Procedures and Dependent Measures

This course was taught as a naturalistic educational experience and not as an exercise in experimental science. An IRB was obtained for the purpose of being able to use the course products following the completion of the semester and grades submission. All sections used the same syllabus consisting of the course description, objectives, textbook, requirements, roughly the same semester schedule, and the general PLA and other guidelines.

The main requirement of interest to this study consisted of the students' written PLAs (see Table 2). There was also an objective multiple-choice component (a midterm and a final) consisting of 100 items (50 each) measuring knowledge, understanding, and application. For the PLAs, at the end of the semester, each student in all four sections submitted a "main portfolio" of their weekly big ideas. Each student also selected from the main portfolio their 5 biggest ideas of the semester and submitted them in a separate "bonus portfolio." The experimenters obtained the bonus portfolios from each of the four participating teachers, numbered all of the portfolios separately for each of the four sections, and used the numbers to randomly draw 15 portfolios from each of the four sections for a total of 5 x 15 = 75 big ideas from each section and a total of 4 x 75 = 300 big ideas for all sections. Then, these big ideas from all conditions were combined and fully

randomized and submitted to two independent judges to rate for use as the main dependent measure of the study.

Raters were given the 8-point LRSS rubric shown in the second left-hand column of Table 1. The rubric scale ranged from 0 to 7 with all numbers in between labeled each in the manner described in Table 1. The LRSS rating scale was submitted to two judges along with the expanded descriptions of the scale categories shown in Table 1 and two separate examples for each category (not shown in Table 1). The judges were graduate research assistant raters selected by the experimenters for their qualifications and extensive coursework background in a combination of 2nd/3rd-person and 1st-person education. They were guided by the experimenters to go through practice sessions using big ideas that were not included in the main data set until they reached reasonable consensus on the scale categories. They then rated the whole set independently and two average rating scores, one for each of the two raters, were calculated for each of the 60 subjects across his or her 5 big ideas.

Results

Multiple Choice Test

We first analyzed the data for the multiple-choice tests. The midterm and final produced similar results. Therefore, we used their combined average. For the overall analysis, we used section as the independent variable. The one-way ANOVA was highly significant, $F(3, 56) = 8.23$, $MSE = 99.12$, $p < .001$, Partial Eta Squared = 0.31. The descriptive results are shown in Table 3. Fisher's multiple comparison tests showed that Experimental Section 2 outperformed the other three sections ($p < .05$). This finding was unexpected. Due to the relatively greater emphasis on intuition> revelation<>reflection cycle, seemingly at the expense of the learning-testing approach, we were predicting lower performance for the experimental than the control sections. Even though the multiple-choice test favored the instruction in the control sections, the observed result revealed that the two experimental sections either did not differ or did significantly better than the control sections on it.

Table 3
Multiple Choice Test Means (and Standard Deviations) for Composite Midterm and Final

Condition (participants)	Section 1 (15)	Section 2 (15)
Control	68.73 (13.20)^{Aab}	77.33 (09.46)^{Ab}
Experimental	76.40 (09.59)^{Aa}	86.73 (06.38)^{Bb}

Notes. Pairwise experimental-control conditions with same lower case superscripts (a or b) are significantly different, $p < .05$. Upper case superscript (A or B) signify GTA-taught^{A} or faculty-taught^{B} conditions. Fisher's least significant difference (LSD) multiple comparison tests, df = 56, standard error = 3.36.

Big Idea Ratings on Levels of Revelatory Strikingness Scale (LRSS)

For each subject, we averaged the ratings across that student's 5 big ideas, resulting in one rating score per student for each of the two raters. Then, we calculated the Pearson correlation between the ratings from the two judges. This correlation was $r(58) = .89$, $p < .001$. Therefore, we averaged the rating for the two judges and used this combined LRSS score for further analysis. The means and standard deviations are in Table 4 along with the relevant significance levels. The one-way ANOVA involving the four sections run on the big-idea ratings (LRSS scores) was highly significant, $F(3, 56) = 101.24$, $MSE = 0.14$, $p < .001$, Partial Eta Squared = 0.84. Fisher's least significant difference (LSD) multiple comparison tests showed that experimental conditions significantly outperformed both control conditions (see Table 4). Judges rated the level of revelatory strikingness (using LRSS) of the experimental big ideas (i.e., MSRUBRs) significantly higher than the control big ideas (i.e., main ideas, in the conventional sense of the term).

Table 4
Mean Big Idea Ratings (and Standard Deviations) on Levels of Revelatory Strikingness Scale (LRSS)

Condition (participants)	Section 1 (15)	Section 2 (15)
Control	1.58 (.39)^{Aab}	1.26 (.44)^{Aab}
Experimental	1.87 (.18)^{Aa}	3.47 (.44)^{Bb}

Notes. Pairwise experimental-control comparisons with same lower case superscripts (a or b) are significantly different, $p < .05$. Upper case superscripts (A or B) signify GTA-taught^{A} or faculty-taught^{B}. Fisher's least significant difference (LSD) multiple comparison test, df = 56, standard error = .138

Discussion and Conclusion

On a weekly basis for a semester, the participants of this study sought big ideas and reflected on them in writing. The big ideas were defined differently for experimental and control conditions by instructors with correspondingly different biofunctional or conventional skills. Experimental participants were guided, by teachers relatively fluent in the nature of spontaneous biofunctional understanding, (a) to shed their customary 2nd/3rd-person leaning-testing skins and, instead, (b) to follow the hindsight trail of their own 1st-person revelations (i.e., their nontraditional understanding version of big ideas). By comparison, directed by teachers fluent in the teaching-testing traditions, those in the control condition followed the trail of 2nd/3rd-person main ideas in their class notes and textbook (i.e., their traditional version of big ideas). The two sets of biofunctional and conventional big ideas were then fully randomized and rated on their levels of revelatory strikingness (using LRSS) by two judges whose independent ratings highly correlated. The results showed that the big ideas of the experimental condition were significantly higher in the level of revelatory strikingness than those of the control condition. This finding supported the *a priori* prediction of our 1st-person education for the development of spontaneous biofunctional understanding relative to education for the

acquisition of the 2nd/3rd-person knowledge (Figure 1). It is also noteworthy that the results of the multiple-choice measure revealed that the focus on the development of 1st-person understanding had no detrimental impact on the acquisition of the 2nd/3rd-person course content.

This article is the first demonstration not only of spontaneous biofunctional understanding but also, in its context, of deliberate change in understanding. The vehicle identified for deliberate change was an intuition> revelation<>reflection cycle. In the present study, participants were encouraged to seek their own revelations and reflect on them in writing which, as the evidence suggests, caused further understanding. Therefore, we may tentatively conclude that deliberate change in understanding is more likely by reflection on 1st-person revelations than on the path of 2nd/3rd-person knowledge internalization. The educational approaches discussed here (Figure 1) delineated the conditions under which changes can or cannot occur in understanding (Table 1). Whereas people may not change their understanding by following the path of someone else's 2nd/3rd-person evidence or expectation, changes in understanding are possible through a 1st-person approach to education on the hindsight trail of intuition>revelation<> reflection spiral for the development of understanding in learners.

The two educational approaches in Figure 1 have deep, albeit often tacit, historical roots each in its own unique past. In as early as the 1980s, the piecemeal establishment of knowledge acquisition (see Figure 1, lower panel and Table 1, rows 1-3) was questioned, redefined, and embodied in the mutually inclusive (or wholetheme) context of intuitive understanding in the spontaneous ground of biofunctional-understanding. From this emerged a unified sense of an inherent self (upper panel; Iran-Nejad, 1994; Iran-Nejad, Clore, & Vondruska, 1984), as opposed to the acquired concept of disembodied self. Two aspects of this reformulation were emphasized. First, counterintuitive at the time, was the idea that the acquired self-concept was by nature phenomenal, transitory, and prone to isolation or forgetting and, by contrast, the spontaneous biofunctional understanding ground of the inherent sense of embodied self was corporeal, biological, enduring, inclusive, and immune to forgetting (see Table 1, rows 4-7). Second, mindful stability/change in the enduring self was a function of the level of coherence/incoherence of its ongoing organization, e.g., achievable through

resisting the usual and seeking the unusual simultaneously, which is exactly what the participants in the experimental conditions were guided to do—resist the customary learning-testing cycle, seek the hindsight trail of their own revelations, and make both enduring by mindfully reflecting on them in writing (Iran-Nejad & Gregg, 2001). These were the conditions; and over the years, the prepared the stage for the present investigation.

The educational approaches outlined in Table 1 and represented schematically in Figure 1 extend beyond their historical roots. They spell out when and why changes in understanding do not occur, consistent with existing interdisciplinary evidence ever since Bacon (1920). The (educational) research on the learning-testing cycle of knowledge internalization by way of deliberate psychological constructionism may have been the culprit, hiding behind the apparent difficulties in moving beyond knowledge and into the realm of understanding (see Bloom, 1984; Remmers et al., 2014). This difficulty is also evident in the pattern of the big-idea ratings shown in Table 4. First, the students in the two control sections averaged no better than the expectation (Table 1) for the learning-testing cycle of the 2nd/3rd-person knowledge internalization (means: 1.58 and 1.26). This finding lends support for the observation that deliberate teaching-testing practices seldom cause more than knowledge internalization per se. Second, the performance of the students in the Experimental Section 1 is also indicative of the kind of challenges that is inherent in any deliberate attempts at directly changing people's 1st-person understanding. The GTA teaching this section had several years of experience and interest in many aspects of 1st-person education including both conceptual and practical knowledge of the intuition>revelation<>reflection cycle. Nevertheless, students in this experimental section outperformed those in the two control sections only by a narrow, albeit significant, margin. The observed mean was (1.87) and standard deviation was miniscule (0.18), barely reaching beyond the learning-testing cycle and by a narrow band still in the vicinity of the performance expectation range indicative of the 2nd/3rd categories of the LRSS rubric or the psychological understanding of the 2nd/3rd-person knowledge. In short, the extensive background and interest of the GTA teaching the Experimental Section 1 made no more than only a dent in the performance of the students in this section. By the same token, the

performance of the students in Experimental Section 2 is also noteworthy in this light. The faculty member teaching this section had lifelong interest, and several decades of experience and firsthand involvement in 1st-person education. However, the observed performance mean (3.47) and standard deviation (.44) for the students in this section averaged by a relatively narrow margin into the deliberate hindsight engagement of the intuition> revelation<>reflection spiral within the triarchic social infrastructure of the discipline as shown in Table 1, i.e.. LRSS 4 (Iran-Nejad, 1980/1987; Prawat, 2000). This is nowhere near a performance expectation inclusive of the full range of the LRSS rubric.

As it is often the case, there are alternative explanations. An obvious interpretation for the conclusion that the findings were the result of the experimental intervention is that the sheer number of the years of teaching experience brought about the results. In particular, the section taught by the faculty member with the lengthiest teaching experience revealed the most gain in the LRSS scores. Clearly, it would have been desirable but not possible to include a control section taught by a conventional faculty member with comparable years of teaching experience. However, all in all this alternative explanation is less likely. First, it does not explain the significant gain by the Experimental Section 1 taught by the GTA with comparable background experience as the two control sections. Second, the experimental teachers were selected a priori based on their *relevant* experience and not by *the sheer years* of experience; and their intervention-relevant teaching experience is more likely to have made the difference than their intervention-irrelevant experience. Nevertheless, for this and related reasons caution is advisable in drawing conclusions; and generalizations about these preliminary findings must await perhaps as many years as it has taken to beat the project into its current shape.

Acknowledgement

This study has been a practice-before-science endeavor. Preparation began in 1988 after more than a decade of groping in the black box of what is now known as spontaneous biofunctional understanding. Two more decades of classroom experience passed including teaching and teacher supervision in the setting. The study was carried out in the Fall of 2008 and presented at the meeting of the Association for Psychological Science, Washington, DC in May 2011. We thank Franco Zengaro, Sally Zengaro, Wei Liu, anonymous reviewers, the

editors of the journal, all those who have contributed to the ideas over the years, and the participant of the study for their valuable contributions.

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