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A Brief Review of Research on Forms of Instruction

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Introduction

Teaching well helps students learn effectively; in fact, the behaviors of a student's teachers are one of the most important factors influencing a student's success (Brophy, 1986; Brophy & Good, 1986; Hanushek, 2002; Hattie, 2009; Muijs, Kyriakides, van der Werf, Creemers, Timperley, & Earl, 2014). However, effective teaching methods do not always coincide with popular or ideologically-based teaching methods; in fact, it is quite common for teacher education programs and the education establishment in general to reject teaching strategies that have been strongly supported by research (Carnine, 2000; Chall, 2000; Engelmann, 2007; Hirsch, 1996; Hirsch, 2014; Kim & Axelrod, 2005; Krahenbuhl, 2016; Stone, 1996; Stone, 2002; Walberg, 2002; Watkins, 1988; Watkins, 1996). The goal of this text is to summarize the empirical research that has been done regarding two general approaches to teaching: minimally-guided instruction and direct instruction.

Current educational practice tends to advocate being a "guide on the side" rather than a "sage on the stage" (phrases coined by Alison King in her 1993 article published in *College Education*). Essentially, pedagogical practices based around minimally-guided instruction -- such as "discovery-based learning," "inquiry-based learning," and "constructivist learning" -- are pushed in colleges of education as being the gold standard of teaching (Carnine, 2000; Chall, 2000; Farkas & Duffett, 2010; Farkas & Johnson, 1997; Hirsch, 1996; Hirsch, 2014; Krahenbuhl, 2016; Matthews, 2003; Mayer, 2004; Stone, 1996; Stone, 2002; Tobias & Duffy, 2009; Watkins, 1988; Watkins, 1996). More traditional teaching methods, such as lecture, are generally considered to be outdated and ineffective. The issue with this trend is that these newer methods of teaching have little or no pedagogical research to back up their effectiveness, specifically

when they are used as one's primary approach to teaching. While traditional lecture may not be the most useful method of instruction, the "guide-on-the-side" based methods are likely even less useful, whereas direct instruction, "explicit teaching," or highly interactive lecture is most effective.

"Guide on the side": More harmful than helpful

An idea known as "best practice teaching" currently dominates colleges of education and the school system of the United States (Hirsch, 1996; Stone, 2002). According to *Best Practice: Today's Standards for Teaching and Learning in American Schools*, these "best practices" involve "schools that are more student-centered, active, experiential, authentic, democratic, [and] collaborative" (Daniels, Hyde, & Zemelman, 2005, p. vii). The authors of this particular book specifically advocate utilizing more "experiential, inductive, hands-on learning," "emphasis on higher-order thinking," and "attention to affective needs and varying cognitive styles of individual students" (Daniels et al., 2005, pp. 8-9). Additionally, they specifically advocate less use of "whole-class, teacher-directed instruction," "presentational, one-way transmission of information from teacher to student," and "rote memorization of facts and details" (Daniels et al., 2005, pp. 8-9). Many of these ideas seem intuitively appealing, and generally speaking, most of these "best practice" strategies make up a broad method of teaching that is called "minimally-guided instruction." Minimally-guided instruction has manifested itself under the names "discovery-based learning," "inquiry-based learning," "constructivist learning," "developmentally appropriate practices," and a plethora of other titles (Clark, Sweller, & Kirschner, 2006; Finn & Ravitch, 1996; Mayer, 2004), and it consists of a very "hands-off" form

of teaching. Rather than having the teacher directly present material to students, classes based around this style consist of very little "teacher-talk" and instead involve highly extensive group work, students teaching each other, and independent investigation. As mentioned in the introduction, this form of education is generally ineffective -- despite the fact that it is incredibly popular in the United States, specifically in colleges of education (Carnine, 2000; Chall, 2000; Farkas & Duffett, 2010; Finn & Ravitch, 1996; Hirsch, 1996; Hirsch, 2014; Krahenbuhl, 2016; Matthews, 2003; Mayer, 2004; Stone, 1996; Stone, 2002; Tobias & Duffy, 2009; Watkins, 1988; Watkins, 1996). In his book *The Schools We Need and Why We Don't Have Them*, professor E.D. Hirsch comments on an earlier version of *Best Practice*, stating the following about the authors' teaching recommendations:

> The authors praise the current consensus on these 'child-centered' principles for being 'progressive, developmentally appropriate, research based, and eminently teachable.' These claims are not, however, 'research based' in the way the authors imply. Quite the contrary. No studies of children's learning in mainstream science support these generalizations. With respect to effective learning, the consensus in research is that their recommendations are worst practice, not 'best practice.' (Hirsch, 1996, p. 173)

There is an incredible amount of scientific literature analyzing minimally-guided instruction and showing that it does not help students learn nearly as much as more direct methods of instruction; according to an article from *Educational Psychologist*, "evidence from empirical studies over the past half-century...consistently indicate that minimally guided instruction is less effective and less efficient than instructional approaches that place a strong emphasis on guidance of the student learning process" (Clark, Sweller, & Kirschner, 2006, p. 75). An article

from the *Elementary School Journal* in which various studies were analyzed notes that "students taught with structured curricula do better than those taught with more individualized or discovery learning approaches. Furthermore, students who receive their instruction directly from the teacher achieve more than those expected to learn new material or skills on their own or from each other" (Rosenshine, 1983, p. 336). A report entitled "What makes great teaching?" (published by Durham University on behalf of the Sutton Trust) that analyzed several hundred empirical studies on teaching describes "discovery-based learning" as an ineffective practice (Coe, Aloisi, Higgins, & Major, 2014); a meta-analysis of nearly 8,000 studies summarized in *Phi Delta Kappan* found that using considerable guidance during instruction is much more effective than minimal guidance (Walberg, 1990); and professor John Hattie's book *Visible Learning* -- a massive analysis of about 50,000 empirical studies -- concluded, among many other findings, that teaching methods based around minimally-guided instruction tend to be quite ineffective, especially when compared with direct instruction (Hattie, 2009). An article from *The Behavior Analyst Today* provides an interesting summary of some of the indications of the literature on minimally-guided instruction:

> Kozloff, LaNunziata, Cowardin, & Bessellieu (2001)...point out that "the design principles underlying child-centered models like 'constructivist,' 'inquiry curricula,' and 'developmentally appropriate best practices' are at odds with the large body of experimental research on learning". Child-centered approaches like constructivism and whole language reading instruction have been criticized for being unconcerned about academic standards...and remiss in providing actual instruction to accomplish academic tasks...Students who do not or cannot self-instruct themselves in these pedagogies are left

> to trail behind in accomplishment, often developing coping strategies in place of actual learning...Without the mastery of basic skills, these students develop what Binder (1996) calls a "cumulative dysfluency" where early deficiencies or discrepancies snowball into a pattern of academic failure and rebellion. (Kim & Axelrod, 2005, p. 113)

Why is it that minimally-guided instruction is so ineffective? Put succinctly, in order to learn, one must develop a broad base of knowledge and practice basic skills to a level of automaticity; when one has a considerable amount of information stored in long-term memory and has simple skills well-practiced, it is possible to focus one's working memory on critical thinking because one no longer has to focus on trivialities, such as calling to mind basic information. This allows for true engagement in higher-order thinking; research in cognitive psychology strongly supports this conclusion (Pinker, 1997; Sweller, van Merrienboer, & Paas, 1998; van Merrienboer & Sweller, 2005; Willingham, 2009). As explained by professor E.D. Hirsch: "First, expertness in [a] skill depends upon the automation, through a great deal of practice, of the repeated, formal elements of the skill, thus freeing the conscious mind for critical thought. Secondly, expertness depends upon the acquisition of the relevant vocabulary, conventions and schemas that form the relevant knowledge base for the skill" (Hirsch, 1996, p. 151). Minimally-guided instruction consists of intentionally withholding information from students; the idea is that, by so doing, students will have to "think critically" in order to learn rather than just having to "memorize facts." Given that knowing basic information and mastering basic skills are necessary prerequisites to higher-order thinking, this is simply unproductive. Some educators may argue that general critical thinking skills could somehow be developed and then applied to information found in outside sources, thus freeing students from having to memorize that information;

however, it is essentially impossible to apply critical thinking skills to external knowledge -- it is absolutely necessary to have knowledge stored in long-term memory in order to think critically, according to cognitive psychologist Daniel Willingham:

> Data from the last thirty years lead to a conclusion that is not scientifically challengeable: thinking well requires knowing facts, and that's true not simply because you need something to think about. The very processes that teachers care about most — critical thinking processes such as reasoning and problem solving — are intimately intertwined with factual knowledge that is in long-term memory (not just found in the environment). (Willingham, 2009, pp. 21-22)

Furthermore, Steven Pinker briefly talks about this -- specifically with regards to teaching mathematics -- in his book *How the Mind Works*:

> Evolutionary psychology has implications for pedagogy which are particularly clear in the teaching of mathematics. American children are among the worst performers in the industrialized world on tests of mathematical achievement. They are not born dunces; the problem is that the educational establishment is ignorant of evolution. The ascendant philosophy of mathematical education in the United States is constructivism, a mixture of Piaget's psychology with counterculture and postmodernist ideology. Children must actively construct mathematical knowledge for themselves in a social enterprise driven by disagreements about the meanings of concepts. The teacher provides the materials and the social milieu but does not lecture or guide the discussion. Drill and practice, the routes to automaticity, are called "mechanistic" and seen as detrimental to understanding...Just as bicycles are assembled out of frames and wheels, not tubes and

> spokes, and recipes say how to make sauces, not how to grasp spoons and open jars, mathematics is learned by fitting together overlearned routines. (Pinker, 1997, pp. 341-342)

Pinker also mentions an interesting and disconcerting quote that he had heard from a contemporary pedagogue, who stated that "it is possible for students to construct for themselves the mathematical practices that, historically, took several thousand years to evolve" (Pinker, 1997, p. 342). Professor J.E. Stone also provides an interesting analogy for this issue: "Think of teaching tennis or golf. You could introduce children to either sport by just giving them a club or racquet and letting them have at it. Or you could start them with lessons in the basics. The former is more or less the approach that the education community idealizes" (Stone, 2002, pp. 40-41). This issue of focusing on higher-order thinking without first establishing foundational knowledge and skills is also addressed in the *Handbook of Research on Teaching*; a meta-analysis by Jere Brophy and Thomas Good provides this information:

> There are no shortcuts to successful attainment of higher-level learning objectives. Such success will not be achieved with relative ease through discovery learning by the student. Instead, it will require considerable instruction from the teacher, as well as thorough mastery of basic knowledge and skills which must be integrated and applied in the process of "higher-level" performance. Development of basic knowledge and skills to the level of automatic and errorless performance will require a great deal of drill and practice. Thus drill and practice activities should not be slighted as "low level." They appear to be just as essential to complex and creative intellectual performance as they are to the performance of a virtuoso violinist. (Brophy & Good, 1986, p. 338)

Despite this, schools tend to push "critical thinking" before teaching basic skills. Perhaps the most egregious example of this is the tendency of many elementary schools to discourage or forbid students from counting with their fingers while doing simple addition and subtraction (Hirsch, 1996; Soylu, Lester, & Newman, 2018); using one's fingers to count is seen as a lower-level thinking skill that should be abandoned in order to require students to use "expert" strategies to solve basic math problems -- as one would expect, this interferes with students' learning of math skills (Hirsch, 1996). Professor E.D. Hirsch offers a phrase that may summarize many of these points: "To stress critical thinking while de-emphasizing knowledge *reduces* a student's capacity to think critically" (Hirsch, 1996, p. 66).

The best way to help students build a foundation of knowledge is to teach it to them directly. With minimally-guided instruction, one actively keeps knowledge away from students; this leads simply to incoherency, because it is impossible to ensure that students will end up figuring out what they need to know -- in his text *Los principios de la acción educativa* [Principles of Educative Action], pedagogue José Luis González-Simancas describes coherence and its importance; he writes, "educative action, in order to guarantee the coherent formation of a person...must also be an integrated whole in which its diverse components functionally interrelate towards the same goal, therefore avoiding interference, dispersion, and the inefficacy of the process" (González-Simancas, 1991, pp. 64-65). In other words, to teach effectively, one must have a clear plan of what material will be covered and how the elements of that material will integrate in order to achieve particular goals. In a minimally-guided situation, it is impossible to establish a plan of what material will be covered, because students will be able to wander in any direction. If, for example, there were a class called "British Literature," one would

expect to be learning about British literature in that particular class; however, if -- as is common with minimally-guided instruction -- the teacher rarely presented information to the class, and the only assignments were essays and projects that allowed students to explore any topic they choose as long as it vaguely pertains to British literature, then one may as well throw out any sort of curriculum, because none of the students will have to learn the set of information that the class is intended to cover. While such assignments are indeed valuable for having students demonstrate acquired knowledge, it would be unwise for a class to include only assignments of this type, and it would be unwise for the teacher to avoid directly presenting material; the lack of focus and excessive dependence on students' self-guidance -- expecting them, essentially, to learn the curriculum on their own or from each other -- results simply in an incoherent mess in which students learn very little. In fact, allowing students to wander aimlessly through the process of learning can lead to their arriving at false conclusions and incorrect or inefficient ways of solving problems; these errors are then quite difficult to remedy (Clark et al., 2006; Hirsch, 1996; Kozloff, LaNunziata, Cowardin, & Bessellieu, 2001). As explained by professor E.D. Hirsch, "[discovery learning] takes more time and is sometimes insecure in its results...Students 'discover' all sorts of things, some of them irrelevant to the purposes at hand and some of them wrong" (Hirsch, 1996, p. 134).

Additionally, it is worth noting that minimally-guided instruction tends to espouse the idea that students have a natural curiosity and love of learning, and therefore, students should be allowed to "develop" with as little interference as possible; in *Best Practice: Today's Standards for Teaching and Learning in America's Schools*, Daniels, Hyde, and Zemelman state that their minimally-guided "best practices" are "rooted in the view of children as fundamentally good,

self-regulating, and trustworthy" (Daniels et al., 2005, p. 26). This developmentalist idea is inaccurate due to the fact that many of humans' natural tendencies are quite negative; aggression and violence are intrinsically ingrained in one's psyche (Peterson & Flanders, 2005; Pinker, 2002). Cognitive psychologist Steven Pinker, in his book *The Blank Slate*, explains that toddlerhood is the most violent age (Pinker, 2002). As psychologist Jordan Peterson states, "[t]wo-year-olds, statistically speaking, are the most violent of people. They kick, hit and bite, and they steal the property of others. They do so to explore, to express outrage and frustration, and to gratify their impulsive desires" (Peterson, 2018, p. 126). Additionally, an article from the academic journal *Science* states that "violence comes naturally to babies" and that "[b]abies do not kill each other, because we do not give them access to knives and guns...The question...we've been trying to answer for the past 30 years is how do children learn to aggress…[T]hat's the wrong question. The right question is how do they learn not to aggress" (Holden, 2000, p. 581). Accordingly, allowing any and all "natural" actions to flourish can lead to quite disastrous outcomes. However, there are -- thankfully -- also natural tendencies of empathy within people (Peterson & Flanders, 2005). Ideally, then, education should aim to foster the positive natural tendencies of children while also teaching children to control their negative instincts -- in sum, not everything natural is good.

Ultimately, a broad base of knowledge and automation of basic skills are nearly impossible to achieve via minimally-guided instruction due to its incoherence, and children tend not to develop well and learn without guidance. Put simply in an article from *American Educator*, "[w]ithholding information from students does not facilitate the construction of knowledge" (Clark, Sweller, & Kirschner, 2012, p. 8). Additionally, in the words of John Amos

Comenius -- the father of modern education -- “It is therefore cruelty on the part of a teacher if he set his pupils to work to do without first explaining it to them thoroughly, or showing them how it should be done, and if he do not assist them in their first attempts; or if he allow them to toil hard, and then loses his temper if they do not succeed in their endeavours” (Comenius, 1657/1898, pp. 138-139).

Is there evidence favoring minimally-guided instruction?

It is important to address as well the evidence and arguments that are frequently used to support minimally-guided instruction. Most of the evidence that is used to uphold minimally-guided instruction consists of three forms: references to small-scale case studies and anecdotes (often coupled with criticism of empirical research), references to untested theories from figures of authority, and conclusions extrapolated from a particular indication of cognitive psychology.

Small-scale, qualitative studies are one of the primary sources of support for minimally-guided instruction (Brophy & Good, 2008; Izumi & Coburn, 2001); according to Brophy and Good, “[t]o date, most applications of constructivism have occurred within small pilot studies implemented by professors or small groups of teachers working closely with professors...Furthermore, most publications on constructivist teaching have been confined to statements of rationale coupled with classroom examples of the principles implemented in practice, without including systematic assessment of outcomes or comparison with other approaches” (Brophy & Good, 2008, p. 354). This issue can be seen with various organizations that support constructivist learning; for example, the National Association for the Education of

Young Children (NAEYC) has been a strong proponent of minimally-guided instruction, specifically under the name of "developmentally appropriate practice" (DAP), but according to an article from *Effective School Practices*, "[t]he long list of references provided in the NAEYC literature is predominantly opinion literature. When asked to highlight the citations that include empirical data, [they] presented a list of 14 references. Of those studies, only seven reported performance data from instruction of some type. One study supported the effectiveness of teacher-directed instruction, not child-directed...No studies had results indicating the effectiveness of DAP" (Grossen, 1993, p. 16). In addition to this reliance on anecdotes and case studies, arguments in favor of minimally-guided instruction tend to disparage or grossly misrepresent mainstream research (Carnine, 2000; Chall, 2000; Hirsch, 1996; Kozloff, 2005), frequently making comments along the lines of "[a]ll research is flawed" (Kozloff, 2005). For example, the previously mentioned book *Best Practice: Today's Standards for Teaching and Learning in American Schools* states the following: "accountability advocates have made 'scientific research' their battle cry...Look: *everyone* in the school debate has stacks of 'scientific research'" (Daniels et al., 2005, p. 22). While case studies and anecdotes are not entirely useless, they are incredibly weak evidence when compared with empirical research (Ellis & Fouts, 1993; Izumi & Coburn, 2001), and attempts to disparage such research are not helpful.

Furthermore, advocates of minimally-guided instruction tend to refer to non-consensus, untested theories that were proposed by authors such as John Dewey, Jean Piaget, and Lev Vygotsky (Anderson, Reder, & Simon, 2000; Anderson, Reder, Simon, Ericsson, & Glaser, 1998; Matthews, 2003; Stone, 1996). It is important to note that "[u]nlike the hard sciences, education tends to refer to its working hypotheses as 'theories' -- a term that most fields of scientific

research reserve to describe hypotheses that have already undergone some level of testing" (Grossen, 1996). These "theories" are very frequently cited without any connection to empirical research. For example, in the book *In Search of Understanding: The Case for Constructivist Classrooms*, the "theories" of Dewey and Piaget are cited as crucial bases for the authors' conclusions (Brooks & Brooks, 1993). *Best Practice: Today's Standards for Teaching and Learning in American Schools* also bases many of its teaching recommendations around the work of John Dewey (Daniels et al., 2005). Additionally, one of the leading advocates of constructivist education in the late 20th and early 21st centuries -- Ernst von Glasersfeld -- cited Piaget's theories as a key support for constructivist teaching (von Glasersfeld, 1995). This pattern of citing Dewey, Piaget, and Vygotsky is seen in the texts of various other advocates of minimally-guided instruction, such as Cobb, Wood, & Yackel (1990); Goodman (1989); and Noddings (1990). Once again, it is important to note that in these texts, the theories of Dewey, Piaget, and Vygotsky are invoked *without* linking them to any empirical research; citing well-known authority figures is not necessarily negative, but it is crucial to back up their claims with empirical evidence.

Additionally, advocates of minimally-guided instruction frequently make an extrapolated argument based on cognitive psychology. Research in cognitive psychology shows that people construct knowledge in their own minds (Clark et al., 2006; Willingham, 2009); what this means is that a person takes the sensory information that he is perceiving and formats it into ideas with meaning. However, those favoring minimally-guided instruction tend to argue that the idea of people "constructing knowledge" means that students should be allowed to discover key information for themselves and "construct" conclusions with it (Brooks & Brooks, 1993; Cobb et

al., 1990; Daniels et al., 2005; Noddings, 1990; von Glasersfeld, 1995); directly teaching information to students is seen as a futile attempt to "transmit" information to the minds of others (Brophy & Good, 2008). This is an inappropriate application of the indications of the cognitive psychology literature; students construct meaning in their minds, but withholding information from students does not help them with this construction. Even when listening to a lecture, for example, a student is actively constructing meaning based on what he is hearing -- there is no evidence that giving students less access to information will facilitate knowledge construction (Clark et al., 2006).

In sum, support for minimally-guided instruction stands almost entirely on three pillars: references to very small-scale case studies and anecdotes (sometimes accompanied with criticism of empirical research), references to untested "theories" from prominent figures in education, and an erroneous conclusion extrapolated from research in cognitive psychology. None of these pillars is particularly strong, and accordingly, there is very little evidence overall in support of minimally-guided instruction. It is important to note, however, that evidence is lacking for the use of minimally-guided instruction as one's *primary* approach to teaching. As will be discussed in the next section, there may still be certain situations suited for minimally-guided instruction.

Is there *ever* a use for minimally-guided instruction?

With all that has been said so far, it may appear that minimally-guided instruction is something never to be used. However, there actually are indeed times when minimally-guided instruction could be implemented in a beneficial way. Specifically, discovery-based or inquiry-based learning can be used as a way for students to *apply* what they have already

learned. For example, in an English class, there may be a unit on how to write a high-quality persuasive essay. The steps for writing such an essay should be directly taught by the teacher, but then perhaps students could be given the choice to write a persuasive essay about any topic that interests them. This gives students the opportunity to explore unique, fascinating topics with little guidance, but they are doing so within the context of the learning objective -- writing a persuasive essay, the steps for which were directly taught. This is an example of how minimally-guided instruction could be used as a great opportunity for students to apply the knowledge that they have acquired.

The issue arises when minimally-guided instruction is used as a means for having students *acquire* knowledge. For example, in the unit on how to write a persuasive essay, a minimally-guided approach would involve students working in groups to brainstorm what they feel are the elements of a high-quality essay; students may read independently about the writing process, and students may revise each other's papers with little guidance from the teacher. The results of this unit would likely be disastrous -- some students may figure out what makes a persuasive essay effective, but many will not, and some may even walk away with misconceptions about what high-quality writing consists of.

Accordingly, minimally-guided instruction can be effective for having students *apply* knowledge that they have learned; however, it is ineffective when used as a way for students to *acquire* knowledge in the first place. Unfortunately, in many colleges of education, minimally-guided instruction is often pushed as the best teaching method under *all* circumstances, and it is claimed that direct instruction should be used as little as possible. In a study from the Thomas B. Fordham Foundation, professors of education were asked if the role of

teachers is to be "facilitators of learning who enable their students to learn on their own" or "conveyors of knowledge who enlighten their students with what they know." 84% agreed with the first statement, 11% agreed with the second, and 5% were not sure (Farkas & Duffett, 2010). Frequently in colleges of education, direct instruction of any kind is characterized as being authoritarian, promoting "passive" learning, squashing students' creativity, focusing on robotic "drill and kill" exercises, crushing students' self-esteem, and preventing students from thinking critically (Christodoulou, 2014; Daniels et al., 2005; Engelmann, 2007; Hirsch, 1996; Kozloff et al., 2001; Krahenbuhl, 2016; Stone, 1996; Stone, 2002; Westwood, 1996). As has already been discussed, knowledge acquisition necessarily precedes any sort of critical thinking (Brophy & Good, 1986; Clark et al., 2006; Hirsch, 1996; Pinker, 1997; Sweller, 2004; Sweller et al., 1998; Willingham, 2009), and directly instructing one's students is the most effective way for them to acquire knowledge (Archer & Hughes, 2011; Clark et al., 2006; Engelmann, 2007; Hirsch, 1996; Kozloff et al., 2001, Rosenshine, 2010; Rosenshine & Stevens, 1986; Stone, 1996; Stone, 2002; Walberg, 1990). Additionally, directly instructing one's students tends to lead to higher levels of academic achievement, motivation, and interest in life-long learning (Adams & Engelmann, 1996; Carnine, 2000; Christodoulou, 2014; Engelmann, 2007; Hirsch, 1996).

Even though minimally-guided instruction does have a time and place, it is not to be used in every single circumstance; however, its advocates often say that it should indeed be used as much as possible. Unfortunately, doing so simply hinders students' learning; as explained by Daisy Christodoulou in her book *Seven Myths About Education*, "if [subjects] are not explained to us and we are left to discover them for ourselves, many people will simply never discover them, or will have very imperfect understandings of them. Even those pupils who do manage to

learn through these methods will have taken a highly inefficient method that will have wasted a lot of time" (Christodoulou, 2014, p. 36).

Pure lecture: Better or worse?

Despite the extensive flaws of minimally-guided learning, is it fair to say that a class based mostly around direct lecturing from the teacher is any more effective? The answer -- perhaps surprising to some -- is yes, according to a 2011 article from *Economics of Education Review*; when compared with a guide-on-the-side approach, "[r]esults indicate that traditional lecture style is associated with significantly higher student achievement. No support for detrimental effects of lecture style teaching can be found" (Schwerdt & Wupperman, 2011, p. 365). Additionally, according to results from Project Follow Through -- the largest educational experiment ever done -- guide-on-the-side approaches are less effective than "traditional schooling" (which tends to consist of straight lecture) and thoroughly designed direct instruction models (Adams & Engelmann, 1996; Barbash, 2012; Chall, 2000; Watkins, 1988; Watkins, 1996). Accordingly, it is fair to say that simply lecturing to students may be better than minimally-guided instruction.

Additionally -- although anecdotal -- various educators have argued that lecture is beneficial as a model for students; in her article "In Defense of Lecturing," professor Mary Burgan states, "lectures do more than provide students with the protective coloration of their fellows in the lecture hall. Even more fundamentally, I believe, students benefit from seeing education embodied in a master learner who teaches what she has learned" (Burgan, 2006, p. 32). Furthermore, Burgan argues that lecture can spare students from excessive exposure to useless

information as other students attempt to learn via “discovery”; “[a positive element of lecturing] may be the student’s relief at having an expert rescue him from mistakes a novice might make along the way -- and also save him the irritation of having to spend his precious time listening to the opinions of classmates rather than a clear presentation of known facts and issues” (Burgan, 2006, p. 34). Burgan also compares good lecturing to a performance art: “Lecture courses by such teachers can be as exciting as hearing a great violinist play the Beethoven concerto. Gaining admission to their performances is one of the reasons to go to college” (Burgan, 2006, p. 34). Another professor -- Mike O’Connell -- in his article “The Sage for the Ages” makes the following observation:

> As a savvy public-school seventh grader back in the mid-1950s, I had noticed early on that the sight of a movie projector or the announcement of a small-group project at the beginning of the class period was a sure sign that the overworked teacher did not feel like teaching that day or that he had nothing better planned or had given up on us. Such ploys were no less educationally bankrupt than the occasional directions to ‘read Chapter 4 -- there will be a quiz in 30 minutes,’ or to ‘take a study hall for the rest of the period.’ (O’Connell, 2007, paragraph 4)

Furthermore, O’Connell points out that “[i]f Will Rogers or Robert Frost or Margaret Atwood came to your campus as a guest speaker, how would you and your students feel if, after five minutes of introductory remarks, one of them said, ‘Now let’s all divide up into small groups for further discussion’?” (O’Connell, 2007, paragraph 18). Additionally, professor and clinical psychologist Jordan Peterson states the following about lecture:

> A lecture is -- somewhat surprisingly -- a conversation. The lecturer speaks, but the audience communicates with him or her non-verbally. A surprising amount of human interaction -- much of the delivery of emotional information, for example -- takes place in this manner, through postural display and facial emotion...A good lecturer is not only delivering facts (which is perhaps the least important part of a lecture), but also telling stories about those facts, pitching them precisely at the level of the audience's comprehension, gauging that by the interest they are showing. The story he or she is telling conveys to the members of the audience not only what the facts are, but why they are relevant -- why it is important to know certain things about which they are currently ignorant...A good lecturer is thus talking with and not at or even to his or her listeners. (Peterson, 2018, p. 251)

Despite all of this, it is likely unwise to use lecture exclusively in one's classroom. As mentioned in the previous section, there are certain cases in which minimally-guided instruction could potentially be implemented in a beneficial way; likewise, lecture can be used under certain circumstances, but it should not be seen as something to be used all the time. Instead, it tends to be best to start out with direct teaching and strong guidance of students, followed by a gradual release of responsibility to students. This approach is the focus of the next section.

Highly interactive direct instruction

Highly interactive direct instruction is the teaching strategy that is most strongly supported by empirical research. In a previously-mentioned article for the academic journal *Phi Delta Kappan*, Herbert Walberg discusses a meta-analysis of nearly 8,000 studies of education;

he finds that elements of instruction are consistently shown to be effective for helping students learn. Specifically, he mentions cues, engagement, and corrective feedback:

> [C]ues show students what is to be learned and explain how to learn it. Their quality depends on the clarity, salience, and meaningfulness of explanations and directions provided by the teacher...The extent to which students actively and persistently participate in learning until appropriate responses are firmly entrenched in their repertoires is known as engagement...A high degree of engagement is indicated by an absence of irrelevant behavior and by concentration on tasks, enthusiastic contributions to group discussion, and lengthy study...Corrective feedback remedies errors in oral or written responses. Ideally, students should waste little time on incorrect responses, and teachers should detect difficulties rapidly and then remedy them. (Walberg, 1990, p. 471)

Walberg states that these elements, when incorporated into teaching, result in effective methods, which include giving students advance organizers, setting clear goals, expressing high expectations for one's students, and asking frequent questions in class (Walberg, 1990). These methods -- along with other aspects -- come together to form a "pattern of teaching" known as "explicit teaching." According to Walberg, "[e]xplicit teaching can be viewed as traditional or conventional whole-group teaching done well…[Explicit teaching is referred to] by different names, such as process-product, direct, active, and effective teaching" (Walberg, 1990, p. 472).

Various other sources have discussed the effective elements of direct teaching in more detail. Jere Brophy and Thomas Good, in an article published in the third edition of the *Handbook of Research on Teaching*, analyzed and summarized an extensive amount of pedagogical research done in the previous few decades. Some of their key findings include that

student achievement, engagement, and motivation are maximized when teachers dedicate most class time to curriculum-related activities, actively present information and give demonstrations, ask many questions, and do not expect students to learn mostly on their own or from each other (Brophy & Good, 1986). In an article from *American Psychologist*, Jere Brophy states the following:

> Students achieve more in classes where they spend most of their time being taught or supervised by their teachers rather than working on their own (or not working at all). These classes include frequent lessons...in which the teacher presents information and develops concepts through lecture and demonstration, elaborates this information in the feedback given following responses to recitation or discussion questions, prepares the students for follow up seatwork activities by giving instructions and going through practice examples, monitors progress on assignments after releasing the students to work independently, and follows up with appropriate feedback and reteaching when necessary. The teacher carries the content to the students personally rather than depending on the curriculum materials alone to do so, but conveys information mostly in brief presentations followed by recitation or application opportunities. There is a great deal of teacher talk, but most of it is academic rather than procedural or managerial, and much of it involves asking questions and giving feedback rather than extended lecturing. (Brophy, 1986, p. 1070)

More recent analyses of pedagogical research have found similar results. In the report "What makes great teaching?" from Durham University, the work of Barak Rosenshine is highlighted: "Rosenshine...has summarised at least 40 years of research on effective instruction with a key set

of principles that maximise its impact. The starting point for this evidence base is a set of correlational studies linking particular observed classroom teacher behaviours with higher student outcomes. For each of these principles, there is also experimental evidence showing that attempts to train teachers in adopting these behaviours can result in changes in teacher behaviours and improvements in student outcomes" (Coe et al., 2014, p. 14). In a report published in 2010 by the International Bureau of Education (a division of UNESCO), Rosenshine wrote about various principles that his decades of research have found to be the most effective; these include reviewing key material at the beginning of class, asking students many questions during class, providing direct models of necessary skills, covering material in small steps, guiding student practice, checking the responses of all students, and taking ample time to present necessary information (Rosenshine, 2010). It is important to note as well that Rosenshine's research comes from three fields of study: research on how one's brain acquires and understands information, research on the practices of effective teachers, and research in which cognitive learning strategies are taught to students. Rosenshine notes that "[a]n interesting finding is that there is no conflict at all between the instructional suggestions that come from each of these three sources. In other words, these three sources supplement and complement each other. And the fact that the instructional ideas from three different sources supplement and complement each other gives us faith in the validity of these findings" (Rosenshine, 2010, p. 6).

In another report published by the International Bureau of Education, many similar findings were described: "[Effective teachers] spend a great deal of time actively instructing by elaborating content for students and helping them to interpret and respond to it" (Brophy, 2002, p. 11). Brophy also recommended utilizing advance organizers, asking many questions, and

spending most class time in active instruction and discourse as opposed to independent work (Brophy, 2002). Creemers and Kyriakides found many similar results and included them in their "Dynamic model of educational effectiveness." For example, they advocate beginning lessons with an overview and outline of the material to be covered, stating objectives for a lesson, directly instructing students, and asking many questions (Creemers & Kyriakides, 2006). Additionally, John Hattie's book *Visible Learning,* in which roughly 50,000 educational studies are analyzed, indicates that direct instruction is a very effective teaching method; actions such as presenting necessary information, modeling processes, asking frequent questions to check students' understanding, and guiding students' practice are emphasized as key (Hattie, 2009).

Put simply, the clear, straightforward teaching that characterizes direct instruction, explicit teaching, or highly interactive lecture is an incredibly effective way to instruct one's students; this has been confirmed repeatedly by the research done over the past several decades (Archer & Hughes, 2011; Becker, 1986; Brophy, 1986; Brophy & Good, 1986; Brophy & Good, 2008; Ellis & Worthington, 1994; Good & Grouws, 1979; Hattie, 2009; Hirsch, 1996; Kame'enui & Simmons, 1990; Muijs et al., 2014; Rosenshine, 1983; Rosenshine, 1997; Rosenshine, 2010; Rosenshine & Stevens, 1986; Stone, 1996; Stone, 2002; Walberg, 1990; Walberg, 2002; Westwood, 1996; Yates, 1988). An article from *Time* magazine makes an interesting point when discussing the teaching of reading to young children by either direct instruction of phonics or by discovery-based "whole language" teaching: "After reviewing the arguments mustered by the phonics and whole-language proponents, can we make a judgment as to who is right? Yes. The value of explicit, systematic phonics instruction has been well established. Hundreds of studies from a variety of fields support this conclusion. Indeed, the evidence is so strong that if the

subject under discussion were, say, the treatment of mumps, there would be no discussion" (Collins, 1997). Nevertheless, many people still object to direct instruction by saying that it only builds students' ability to memorize and practice rote drills, and that it makes students less interested in learning. However, these criticisms are not accurate; as explained by professor John Hattie in his comprehensive book *Visible Learning*, "[o]ne of the common criticisms is that Direct Instruction works [only] with very low-level or specific skills, and with lower ability and the youngest students. These are not the findings from the meta-analyses" (Hattie, 2009, p. 206). There is considerable evidence that teaching in a more direct manner is very effective for developing students' ability to think critically (Brophy & Good, 1986; Chall, 2000; Rosenshine & Meister, 1992). As previously mentioned, research in cognitive psychology clearly indicates that a base of knowledge and simple skills is an absolute prerequisite to critical thinking (van Merrienboer & Sweller, 2005; Pinker, 1997; Sweller et al., 1998; Willingham, 2009), and considering that direct instruction has much more focus than minimally-guided instruction on building students' base of knowledge, it makes sense that direct instruction would ultimately lead to critical thinking. It is important to emphasize as well that using direct instruction tends to promote critical thinking not simply because it builds students' background knowledge and basic skills, but also because direct instruction can -- and in many situations, should -- include in-depth class discussion. This depends on the type of subject matter and content being covered, but often, after key information has been presented and explained/modeled by the teacher, the students can engage in discussion in order to practice or apply the knowledge that they have acquired; the teacher should, of course, ask many questions and guide the discussion in order to ensure that students are applying the necessary material -- if students are thrown into a discussion without

guidance and necessary background knowledge, they tend to learn little or nothing (Laurillard, 2002).

Additionally, in classes where students are mostly taught directly by the teacher rather than attempting to learn via minimal guidance, students tend to be more engaged in the material and more motivated (Chall, 2000; Hirsch, 1996; Rosenshine & Stevens, 1981; Rosenshine & Stevens, 1986). In fact, using minimally-guided instruction can hurt students' self-esteem by leading to students' feeling "lost and frustrated" due to the number of "false-starts" that can occur before correct information is learned (Clark et al., 2012). Furthermore, direct instruction can be quite helpful for students' creativity (Gage, 1978). Creativity -- perhaps contrary to common belief -- flourishes best under structured conditions (Sagiv, 2009). Additionally, having thorough, detailed knowledge of a subject is necessary for one to demonstrate creativity in tasks related to that subject (Chall, 2000; Cropley, 1995; Sweller, 2004). Therefore, using direct instruction -- which builds students' base of knowledge and basic skills much more than minimally-guided instruction -- is quite conducive to creativity.

A note on the importance of "academic achievement"

As noted, highly-interactive direct instruction is effective for promoting academic achievement, critical thinking, and even creativity. Some critics, however, would argue that any sort of focus on "academic achievement" or "test scores" is inappropriate -- how can simple numbers define a student in any capacity? This is a fair criticism; however, a look at the evidence on academic achievement and test scores reveals some striking information. Firstly, academic achievement early in one's educational career -- such as in elementary school -- is highly

predictive of what level of education a person will ultimately reach (Becker, 1986; Gersten & Keating, 1987; Meyer, 1984). Academic achievement and level of education are strong predictors of job performance, occupational level, social status, income, and likelihood of being incarcerated (Anderson, Reder, & Simon, 2000; French, Homer, Popovici, & Robins, 2015; Neisser et al., 1996; Roth, BeVier, Switzer, & Schippmann, 1996; Sum, Khatiwada, & McLaughlin, 2009; Wise, 1975). Accordingly -- although there is oversimplification in describing someone based on numbers -- academic achievement and educational level should not be dismissed given their predictive power, and considering that certain teaching methods increase these measures, such methods should not be ignored.

Why are ineffective methods popular?

Considering all of the research discussed so far, it would appear logical for methods based around direct instruction to be adopted in schools. However -- as mentioned various times -- there is great resistance in schools and teacher education programs in the United States to any sort of direct instruction, along with huge support for using minimally-guided instruction in as many classroom situations as possible (Carnine, 2000; Chall, 2000; Farkas & Duffett, 2010; Finn & Ravitch, 1996; Hirsch, 1996; Hirsch, 2014; Krahenbuhl, 2016; Matthews, 2003; Mayer, 2004; Stone, 1996; Stone, 2002; Tobias & Duffy, 2009; Watkins, 1988; Watkins, 1996). Perhaps due to this, teacher certification tends not to make teachers more effective (Hanushek, 2002; Hattie, 2009). Why is this the case? According to a comprehensive article published in 1996 in *Education Policy Analysis Archives*, it has to do with an ideology called “developmentalism” that rules the education system of the United States. Developmentalism is described as such:

"developmentalism...presumes 'natural' ontogenesis to be optimal and it requires experimentally demonstrated teaching practices to overcome a presumption that they interfere with an optimal developmental trajectory" (Stone, 1996, p. 1). Essentially, educational practices that appear to go against "natural," unimpeded development of a student's capacities are rejected regardless of empirical evidence. The result of this is that students are not pushed or held to any sort of standards:

> Given that developmentally appropriate teaching and parenting must be fitted to the child's current developmental status, and given that efforts to exhort or otherwise induce advancement beyond the child's developmentally governed potentialities are considered risky at best, teachers and parents are given to understand that expecting too little is a much better choice than expecting too much. From a developmentalist perspective, if opportunity and conditions conducive to developmental advancement have been maximized, the developmentally guided teacher or parent has done all that can safely be done. In effect, developmentalism discourages teachers and parents from asserting expectations or otherwise acting to induce more mature behavior. Even in the face of noticeable deficiencies or problematic conduct, the developmentally appropriate course of action is that which is congenial to the child's apparent developmental status, i.e., his or her present behavior and inclinations. Continuing lack of advancement in spite of suitable facilitating conditions is taken to reflect delayed emergence of developmentally governed potentialities, not ineffective teaching. (Stone, 1996, p. 15)

Accordingly, many empirically-supported teaching strategies are routinely ignored or dismissed. For example, direct instruction is not popular in the education community:

> [S]chools have largely ignored the availability of a number of teaching methodologies that seem capable of producing the kind of achievement outcomes demanded by the public. They are experimentally validated, field tested, and known to produce significant improvements in learning. Instead, the schools have continued to employ a wide variety of untested and unproven practices which are said to be "innovative"...In particular, teaching practices such as mastery learning...direct instruction...positive reinforcement...cues and feedback...and the variety of similar practices called "explicit teaching"...are largely ignored despite reviews and meta-analyses strongly supportive of their effectiveness. Yet methodologies such as...the open classroom...inquiry learning...and a variety of practices purporting to accommodate teaching to student diversity...continue to be employed despite weak or unfavorable findings or simply a lack of empirical trials. (Stone, 1996, p. 2)

Where did this ideology of "developmentalism" originate, and why did it take hold of the education system of the United States? In brief, a public outcry against typical educational practices occurred in the late 1800s; in the 1890s, Joseph Mayer Rice -- an author for the magazine *The Forum* -- circulated around the United States and assessed the practices of many public schools. In general, he concluded that the set-up of schools was overly authoritarian, focusing extensively on teacher control, senseless drills, and meaningless rote memorization (Cremin, 1964). In response to these criticisms, there was a call for a different approach to schooling. Two philosophers of education -- G.S. Hall and John Dewey -- had already, at this time, started writing about a form of developmentalist education that eventually took on the name of "progressive education." This was a "student-centered" form of education that -- being a

developmentalist concept -- advocated allowing students to flourish "naturally" with as little outside interference as possible (Cremin, 1964). John Dewey, for the most part, supported the same concepts, as evidenced by his texts "My pedagogic creed" (1897) and *Democracy and Education* (1916). According to the aforementioned article from *Education Policy Analysis Archives*, Dewey expressed the following ideas:

> Dewey believed that evolution had equipped man with characteristics fitted to certain types of naturally occurring experiences and that the learning that emerges as the individual encounters these experiences is optimal. Quality teaching was, therefore, the practice of fitting educational experiences to the emerging characteristics and proclivities of the child for the purpose of optimizing "growth"...Because he believed that true understanding was personalized, Dewey held that educational aims could not be dictated by any agent external to the student. For this reason, Dewey's concepts severely limited the ability of teachers to insure that students acquire any preconceived understanding or knowledge. (Stone, 1996, pp. 8-9)

Due to the popularity of G.S. Hall and John Dewey, along with other philosophers who espoused similar ideas (such as William Kilpatrick, author of "The Project Method" [1918] and Harold Rugg, author of "The Child-Centered School" [1928]), and Dewey's eventual role in defining the curriculum of many teacher education programs in universities across the country, this idea of "progressive education" became thoroughly ingrained in the concept of teaching:

> By the late nineteen forties and early fifties, the language and concepts of progressive education were no longer thought of as representing a particular educational view. Rather they were simply considered good and sensible educational practice...Even though

> progressive education per se eventually fell into disrepute, its concepts and jargon were so thoroughly established as 'conventional wisdom' that the reasonableness and intuitive appeal of all subsequent educational theorizing was largely governed by its compatibility with progressive concepts -- concepts that for the most part embodied one or another version of developmentalism. (Stone, 1996, p. 10)

Accordingly, developmentalism (and educational practices based around it) took hold of American education, and so far, it still has a strong grip. Education professors -- as already mentioned various times -- overwhelmingly advocate for near exclusive use of minimally-guided instruction despite its lack of empirical support. As professor J.E. Stone explains, "[i]n the world of teacher education, learner-centered instruction is the standard against which all other forms of teaching are judged" (Stone, 2002, p. 39). Accordingly, in many highly successful schools in the United States, teacher education programs are often blamed -- likely correctly -- for producing low-quality teachers due to their support of ineffective methods:

> Many of the principals included in this study blame much of this system-wide failure on our schools of education. To begin with, the teacher certification process discourages many potential candidates and positively bars the admission of many others who might otherwise be attracted to teaching. But more importantly, the actual content of so much teacher training is not directed to improving teacher performance…"Teachers coming from university teacher preparation programs do not know how to teach reading," says Thaddeus Lott, the former principal of Wesley Elementary in Houston. "When a first-year teacher comes to Wesley Elementary it then becomes the responsibility of the

> administration on the campus to train them. They must be taught what and how to teach. They must also learn how to manage a classroom." (Carter, 2000, p. 19)

A report from *Public Agenda* also explains that "professors of education have a distinctive, perhaps even singular, prescription for what good teachers should do...To a surprising extent, the professors' views also differ from those of most classroom teachers" (Farkas & Johnson, 1997). Additionally, in the conclusion of the report, a concise assessment of the situation is given:

> Professors of education have a particular vision of what teaching should be -- one that has some appealing features. But their prescriptions for the public schools gloss over the concerns voiced variously by the public, parents, classroom teachers, business leaders, education reformers, and even students themselves...Education professors argue passionately for an approach to teaching that will nurture inquiring, curious minds that are open to new information, capable of solving problems, and respectful of different points of view and alternative paths for getting from here to there. Surely no one could fault this premise, and virtually every group (however much they may argue about other matters) agrees that love of learning is a worthy goal. But while others acknowledge the professors' vision, most of the professors themselves seem remarkably dismissive of the educational concerns of nearly everybody else. (Farkas & Johnson, 1997, p. 28)

This pattern amongst education professors of ignoring the educational concerns of the public and the indications of the research literature in education, along with strongly supporting minimally-guided instruction, has endured up through the present (Farkas & Duffett, 2010; Krahenbuhl, 2016). Education professors, unfortunately, impose their highly subjective views on their own students, who are future teachers, thus perpetuating a cycle of ineffective educational

practices. This has had (and will continue to have if not addressed) devastating effects on society; for example, there is a considerable achievement gap in the United States between students of color and white students, and between low-income students and high-income students (Chall, 2000; NCES, 2009; NCES, 2015; Hirsch, 1996; Kerkman & Siegler, 1993; Viadero & Johnston, 2000), and the scientific literature shows quite clearly that implementing minimally-guided instruction tends to *widen* the achievement gap in addition to hurting the achievement of all students in general (Chall, 2000; Clark et al., 2012; Hirsch, 1996; Kim & Axelrod, 2005; Kozloff et al., 2001). Accordingly, minimally-guided instruction is a threat to equality and social justice, despite its popularity. In the words of E.D. Hirsch, "the educational community has succeeded...in persuading the world that its antiknowledge views coincide with ethical and social right-thinking. The old guard has brilliantly succeeded in portraying its failed ideas as new, research-based, and conducive to social justice, although they are none of these" (Hirsch, 1996, pp. 64-65).

Summary of findings and recommendations for teaching

The vast majority of pedagogical research that has been done indicates that highly dynamic, interactive lectures lead to the highest level of student achievement and engagement. In order to build instruction that is in accordance with the literature, it is advisable to keep in mind certain principles.

Firstly, knowledge necessarily precedes critical thinking (Brophy & Good, 1986; Clark et al., 2006; Hirsch, 1996; Pinker, 1997; Sweller, 2004; Sweller et al., 1998; Willingham, 2009).

Before expecting one's students to engage in higher-order thinking and creative pursuits, it is absolutely required to ensure that one's students have acquired basic knowledge and skills.

Secondly, extensive literature indicates that explicit instruction, direct instruction, active teaching, and other similar effective approaches consist primarily of modeling the application of knowledge to students, then guiding students through application of knowledge in an interactive manner, then giving students time for independent practice (Archer & Hughes, 2011; Brophy, 1986; Brophy, 2002; Brophy & Good, 1986; Brophy & Good, 2008; Creemers & Kyriakides, 2006; Ellis & Worthington, 1994; Good & Grouws, 1979; Hattie, 2009; Hirsch, 1996; Kame'enui & Simmons, 1990; Muijs et al., 2014; Rosenshine, 1983; Rosenshine, 1997; Rosenshine, 2002; Rosenshine, 2010; Rosenshine & Stevens, 1986; Walberg, 1990; Walberg, 2002; Westwood, 1996; Yates, 1988). For example, if a teacher would like to teach her students how to solve a specific type of math problem, she should first explain and model the steps for solving such problems; then, she should go through example problems with her students in a highly interactive way that involves asking the class many questions; finally, she should give her students time for supervised, independent practice.

Third, minimally-guided instruction can be useful in certain circumstances in which students are to apply knowledge that they have learned. However, all evidence indicates that using minimally-guided instruction as a way for students to acquire knowledge and skills in the first place is inefficient, ineffective, and may lead to "learning" misconceptions that interfere with a student's education. Accordingly, minimally-guided instruction should generally be avoided, and when it is used, it must be implemented very carefully.

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