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Leading the Blind
A Critical Look at Visible Learning

Greg R. Johnson and Melanie D. Janzen

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Article abstract

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Greg R. Johnson
Melanie D. Janzen
University of Manitoba

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Abstract

In 2009, John Hattie's book Visible Learning: A Synthesis of over 800 Meta-Analyses Relating to Achievement brought big data to education. In the decade and a half since Visible Learning was originally published it has been aggressively marketed and has now grown into a large suite of branded books, tools, and products. Visible Learning continues to exert influence over educational thinking, policy design, and decision making. This critical essay probes the foundations of Visible Learning, seeking to better understand the work's significance. Criticism is leveled at the methodology, positionality, capitalistic motivations, and mischaracterization of science underpinning the book and the subsequent franchise that has grown from it. The essay argues that the philosophy of education represented by Visible Learning resides within a reductive neoliberal ideology that pushes problematic reform, demands unreasonable accountability, and promotes the de-professionalization of teachers.

In late 2008, publication of the now famous book *Visible Learning: A Synthesis of over 800 Meta-Analyses Relating to Achievement* (*Visible Learning*), brought Professor John Hattie's vision of education to the world. *Visible Learning* reveals "what works best" (Hattie, 2009) in education through a proprietary mix of statistics and data-inspired storytelling. Barometer graphics illustrate the *effect sizes* of 138 educational interventions, ranking them from best to worst. The book was an instant hit, with an early reviewer stating *Visible Learning* "…reveals teaching's Holy Grail" (Mansell, 2008).

At the time *Visible Learning* was released, educational reforms rooted in neoliberal thinking (Cahill & Konings, 2017; Davies & Bansel, 2007; Harvey, 2005; Sahlberg, 2012) were well under way globally. *No Child Left Behind* (NCLB) legislation in the United States had been tying educational funding to assessment (Linn et al., 2002) for close to a decade. Achievement metrics like the Organization for Economic Co-operation and Development's (OECD) PISA[1] testing scheme (Bouhali, 2015; Sjøberg & Jenkins, 2022) fueled competition between national education systems for top scores. Achievement on international testing had been statistically linked to economic growth (Hanushek et al., 2007), an apparently causal relationship with an "aura of scientific truth" (Komatsu & Rappleye, 2017, p.185). Although the legitimacy of that relationship has since been challenged (Komatsu & Rappleye, 2017; Sjøberg & Jenkins, 2022), it helped cement achievement score improvement as a major driver of educational reform rhetoric.

School administrators then, as now, endured heavy pressure to improve student achievement, often while their budgets shrank (Biesta, 2007; de Saxe et al., 2020; Malone & Hogan, 2020; Sahlberg, 2012; See, 2018; Tuck, 2013; Wescott, 2022; Yoon et al., 2020). In parallel, a growing "medicalization" of educational research demanded empirical evidence of "what works" (Biesta, 2007; Bridges, 2011; Carnine, 2000; Malone & Hogan, 2020). Terms such as *efficacy, evidence-based decision making,* and *intervention* had been transplanted from clinical research into educational discourse, and empirical approaches to inquiry had come to draw the lion's share of educational research funding (Bridges, 2011).

John Hattie's home country of New Zealand had itself been an early experiment in neoliberal (Harvey, 2005) deregulation and privatization initiatives (Davies & Bansel, 2007; Jesson & Simpkin, 2007; Marcetic, 2017; O'Neill, 2015; Peters, 2000). In 1989, the New Zealand government had implemented a "radical" (O'Neill, 2015, p.831) privatization, or *devolution,* of its public education system (Jesson & Simpkin, 2007; Openshaw, 2014; Peters, 2000). The resulting marketized system likely influenced the author's perspective on education, and surely provided conditions for the commercialization of his academic work.

In 2009 *Visible Learning* was in step with the times and has served to help perpetuate the assessment obsession of the era. It is packed with data in figures, tables, and graphics. It seems scientific and wields a gargantuan bibliography. It boldly declares to have empirically found "what works best" (Hattie, 2009, p.ix) in education. It assures readers that technical changes to teacher and student behavior are *more* effective than expensive system-wide change. *Visible Learning* was welcomed as "the bible" (Lilley, 2022, p.48), a "magic bullet," for pressured administrators and policy makers.

In 2010, New Zealand based *Cognition Education* launched a commercialization effort based on Hattie's *Visible Learning* work, branded *Visible Learning*^{plus}. In 2018, *Cognition* sold

[1] https://www.oecd.org/pisa/aboutpisa/

Visible Learning^{plus} (or *Visible Learning+*) to *Corwin.* At the time of writing, a search for "Visible Learning" on the *Corwin* webstore returns an avalanche of books, guides, and bundles ($9.95 to $285 U.S.). There is an online *Visible Learning+* professional development series, a *Visible Learning+* awards system for schools, annual institutes ($369 per person), certifications ($2750 per seat), webinars, and an app. A sequel to the original *Visible Learning* book ($29.95) was released in March 2023. John Hattie is a charismatic and self-assured spokesman for the work, and the Hattie name has become as famous as the body of work itself. He remains a frequent event keynote speaker.

Visible Learning has clearly achieved financial success, but, as it has grown, it has propagated a narrow, technical view of teachers and students, and a measurement-driven perspective of educational purpose. *Visible Learning* plays a role in propagating the marketization, de-professionalization, and scientism of contemporary efficiency reform movements in education. In this critical essay we examine *Visible Learning* from four related angles hoping to add our criticism to a growing body of work resistant to these types of detrimental views and reforms.

Hattie's Meta-Meta-Analysis: Bullying by Numbers

Visible Learning is not a meta-analysis; however, it uses *Cohen's d effect sizes*, the statistical output associated with the meta-analysis technique. Whereas meta-analysis (Coe, 2002) is a well-known, albeit controversial (Eysenck, 1978; Page & Moher, 2016) statistical method for comparing two conditions across many individual studies, *Visible Learning* is Hattie's own invention. Explaining this method, Hattie (2009) writes, "This book is based on a synthesis (a method referred to by some as meta-meta-analysis) of more than 800 meta-analyses about influences on learning…" (p.3). Elaborating slightly:

> As an example of synthesizing meta-analyses, take an examination of five meta-analyses on homework: Cooper (1989; 1994); Cooper, Robinson, & Patall (2006); DeBaz (1994); Paschal, Weinstein, & Walberg (1984). Over these five meta-analyses there were 161 studies involving more than 100,000 students, which investigated the effects of homework on students' achievement. The average of all these effect sizes was d = 0.29, which can be used as the best typical effect size of the influence of homework on achievement. (Hattie, 2009, p.8)

This is the full extent of the explanation of the technique in the book, and it is in our view too brief, and too opaque, considering the value that has been placed on these effects. The mentioned 5, 161, and 100,000 do not contribute to d=0.29, an average of unstated values.

Appendix A (Hattie, 2009, p. 296) lists all 800 included meta-analyses in a large table. Through a manual search, the five mentioned *Cohen's d* values pertaining to homework were discovered. They are *d=0.36*, *d=0.21*, *d=0.39*, *d=0.21*, *d=0.28*. The average of these produces d=0.29 as we show below:

$$d = \frac{(0.36+0.21+0.39+0.21+0.28)}{5} = 0.29$$

In contrast to the size of the book and the pages dedicated to discussing the merits and technicalities of the established meta-analysis technique, the meager description provided for

Hattie's *meta-meta-analysis* equation stands out. It would have been trivial to at least have included the equation we provided above. We view this opaque exposition of methodology as outside the spirit of scientific inquiry (Elster, 2011; Feynman, 1974; Frankfurt, 2005). Pseudoscientific work (Bergeron & Rivard, 2017; Moberger, 2020) on the other hand, tends to both amplify its mathematical sophistication and obfuscate its nature (Romer, 2015).

Further investigation of the "homework" effect reveals that the five meta-analyses included have input study pools ranging from 15 to 77 studies, totaling the 161 papers mentioned. These meta-analyses occurred between 1984 and 2006, with input research stretching further back in time. They represent a declared total of 105,282 subjects (likely lower as some input papers may appear in multiple meta-analyses). Without significant forensic investigation on the part of the reader it is impossible to fully trace all this data to its source. Finding the original meta-analyses requires access to databases, and the skills to locate the work within them. Some of the meta-analyses included in *Visible Learning* are obscure, unpublished, or come from atypical sources. For example, the only meta-analysis for "clarity" is an unpublished thesis from 1990. The average K-12 educator would be unlikely to have the time, skill set, or access to challenge Hattie's claims.

Visible Learning places homework 88th on its 138-effect list, but there are many unanswered questions about how this was concluded. Were *all* existing meta-analyses to do with homework included? What criteria placed a meta-analysis into the "homework" effect? How did the author of a meta-analyses choose what papers they included? Were meta-analyses from outside K-12 contexts included, and if so, why? Would weighted averages based on the number of studies in a meta-analysis (15-77) change effect size? Beyond methodological questions, epistemological concerns remain regarding Hattie's narrative of education reduced to effect sizes – what does d=0.29 *mean* and what are its units of measurement?

Visible Learning sets d=0.4 as a benchmark. Interventions with effect sizes above 0.4 are said to be within the "zone of desired effects." This reference point lends *Visible Learning's* effect sizes the appearance of being a ratio measurement scale, like those found in the physical sciences. However, d=0.4 is (rather arbitrarily) the average of the 138 effect sizes included in *Visible Learning*, untethered from a physical quantity, and are relative to a value that can change as new data is entered. Hattie tells us, without explanation, that d=0.4 correlates to one year's improvement, but not how this was determined or what a one-year improvement means.

A d=0.29 implies that giving homework to students is of scant pedagogical value. However, Hattie (2009, p. 8) writes, "…compared to classes without homework, the use of homework was associated with advancing children's achievement by approximately one year" (Hattie, 2009, p.8) and "…there are marked differences in effect sizes between elementary (d = 0.15) and high school students (d = 0.64), which probably reflects the more advanced skills of studying involved in high school" (Hattie, 2009, p. 235); not much of a revelation, and not what is implied by a rank of 88/138 for homework. Homework *in high school* (d=0.64) is well within Hattie's "zone of desired effects" placing it 17th on the 138-effect list.

Compounding concerns, like other effects in *Visible Learning,* what is meant by "homework" is not clear. Is music practice considered homework? What about math flashcards, or penmanship exercises? Should high school students do math problems outside class time? What role does socio-economic status play in the assigning of homework? Are there differences if students are in an honours program or in an apprenticeship program or on credit recovery plans? What about assignments during remote learning? Can homework be used as a method to encourage

participation from the home? Context and purpose are important to understanding the value of pedagogical tools. Hattie's meta-meta effect size for homework is simply too blunt an instrument to base policy or practice on, and the same could be said for all *Visible Learning's* effects.

Classrooms, as microcosms of society, have infinite variables at play. This leaves *Visible Learning* forever defining new ones. Since 2009, a *Visible Learning* database has been greatly expanded. Input studies now number over 2100 (up from the original 800) and the initial 138 effects have ballooned to over 350. Due to the nature of averages, adding new *d* values to an effect changes them by only a single share of the total (declining in impact to *effect size* as a category grows). The addition of new, potentially paradigm shifting work carries no more weight than what is already there; and since there is no mechanism for removal, old data, even if superseded, remains. This is not a whittling down to some finer truth or deeper understanding. It is the perpetual combination and shuffling of old with new effects. Even were it possible to define and know absolutely the size of every imaginable educational variable, the fact remains, as Hayek (2005) famously illuminated long ago: humans are free-will actors and will behave according to individual interpretations of information available, not to immutable physical laws. This affects both the gathering and application of findings. Good teachers understand this, read the room, and dynamically adjust on the fly; blanket "what works best" prescriptions hinder good teaching.

Visible Learning consumers may not understand that empirical data in the social sciences are context specific and of limited generalizability (Phillips, 2014). The context and methodology of data collection and its analysis must be clear for that data to be useful. The scope of a finding is necessarily restricted to settings like that which produced it. Hattie's method mixes findings from multiple meta-analyses, representing a myriad of contexts and a range of unexamined qualities (Eysenck, 1978). Loose indications of general trends may emerge from synthesis of meta-analysis, but its findings should never be mistaken for hard scientific facts.

Visible Learning is limited strictly to empirical research, and therefore excludes findings from qualitative research studies. It does not speak to the nuances of daily classroom life, and importantly, excludes consideration of factors beyond school walls:

> It is not a book about what cannot be influenced in schools—thus critical discussions about class, poverty, resources in families, health in families, and nutrition are not included—but this is NOT because they are unimportant, indeed they may be more important than many of the influences discussed in this book. It is just that I have not included these topics in my orbit. (Hattie, 2009)

This seems an understatement. Snook et al. (2009) cite research indicating that arguably up to 80% of a student's achievement owes to forces beyond the classroom (values, affluence, race, class, health, nutrition, trauma, etc). These are complex interrelated issues that often defy empirical metrics. By reducing education to the achievement metric, the *Visible Learning* brand helps to silence vital debate that *should* be occurring in and around education.

Had John Hattie presented *Visible Learning* with appropriate caveats, it could have stood as a remarkable testament to the difficulty of educational research; especially if that research is confined to the empirical. Instead, it has been sold as education's scientific final word. It now serves to fuel an expanding constellation of branded *Visible Learning* "how-to" products, and as a source of "research on tap" (Sergiovanni, 1989, p.96) for bully agendas (Lilley, 2022; Wrigley, 2015). It silences debate, muddies the water of what is and isn't science, and sows a mistrust of teachers as dedicated, rational professionals, capable of knowing their craft. We wonder how often

common sense has been ignored in pedagogy and policy on the misplaced confidence that *effect sizes* truly reveal the hidden "holy grail" of teaching.

Hattie's View of Teachers: Surveillance of an Immature Profession

The pursuit of the scientific management of teaching lies at the heart of *Visible Learning*. As Eacott (2017) argues, "Traces of Taylorism remain in such an approach, namely the pursuit of 'one right method' and the underlying generative principle of perpetual improvement…" (p. 416). Taylor's (1911) seminal time and motion studies of steel workers called for strict "scientific" management of labor. Eventually the invention of the assembly line transferred control over the pace of production from shop floor craftsmen to the offices of engineers and managers (Noble, 1978). Increases in productivity and predictability owing to Taylorism, the related concept of Fordism, and now post-Fordism, with its information gathering (Portnoi, 2016), have enshrined accountability and surveillance schemes into modern workplaces (Manokha, 2020; Rosenblat et al., 2014). Highly surveilled workshops partially inspired Foucault in his panopticon metaphor (Foucault, 1977) whereby he argued that merely the idea that one may be under observation influences behavior. The idea that education should be similarly scientifically managed has appealed to various reform agendas for generations. That vision includes standardized classrooms, scripted teaching of pre-set outcomes, measurability, accountability, the incentivization of competition, and panoptic surveillance of teachers and students.

Hattie's work immediately before the publication of *Visible Learning* involved building a computerized tool called "assessment tools for teaching and learning" (aSTTle) (Brown, 2019; Hattie et al., 2003) for the New Zealand government. The panoptic (Foucault, 1977) potential for this tool is apparent. Writing in 2003, Hattie states that for "…managers who want to be able to constantly monitor and report school-wide trends… It is anticipated that asTTle version 4 will be fully networked, permitting managerial monitoring of school-wide use of asTTle across the six subjects" (Hattie et al., 2003, p. 775). The now familiar barometer graphic used in *Visible Learning* was imported from the asTTle program, and along with it came the same ethic of Taylorism. Hattie positions teachers just as Taylor did grunt workers at Bethlehem steel: "stupid" and "phlegmatic" (Taylor, 1911, p. 59), requiring surveillance and management by superiors. Several quotes are illustrative:

- "In many classrooms and schools, there is evidence of low effect sizes, reliance on poor methods and strategies, a dependence on 'war stories and anecdotes' and an agreement to tolerate different and sometimes poor teaching" (Hattie, 2009, p. 257).
- "We seem to believe that every teacher's stories about success are sufficient justification for leaving them alone" (Hattie, 2009, p. 1)
- "…the reason teachers can so readily convince each other that they are having success with their particular approach is because the reference point in their arguments is misplaced" (Hattie, 2009, p. 3)
- "…another reason for the lack of change is the over reliance on teacher judgments rather than evidence" (Hattie, 2009, p.253)
- "…here is a classic case of an immature profession, one that lacks a solid scientific base and has less respect for evidence than for opinion and

> ideology" (Carnine, 2000, p.12 in Hattie, 2009, p.258). Notably, this quote comes from a piece called "Why Education Experts Resist Effective Practices (And What it Would Take to Make Education More Like Medicine)" written for the conservative educational think-tank and policy-influencing Fordham Institute (Phelps, 2018).

The author positions himself as an authority and possessor of superior knowledge with teaching dismissed as an "immature profession." This belittling rhetoric, besides acting as a sales pitch to school managers, sows distrust of teaching as a profession. The belittling tone serves larger agendas with goals of further marketization of public education. If teaching can be sold as immature, un-professional, simple, and technical, then support for teachers and their unions softens, allowing private interests to infiltrate with promises of cheap fixes for perceived, or even manufactured short-comings (Barkan, 2012; Jesson & Simpkin, 2007; O'Neill et al., 2016; Phelps, 2018; Ryan, 2017; Tuck, 2013).

In *Visible Learning*, Hattie points to surgery and mountain rescue as "scientific" occupations for teaching to emulate. These occupations have obvious measurable elements with "right" and "wrong" approaches and stark consequences for failure to observe best practice. We concur that surgeons *should* consult data on best techniques, and mountaineers must use correct knots. Indeed, there are technical aspects to teaching as well, efficiently organizing a classroom schedule, or the best techniques for teaching handwriting. However, teaching's main concern is not to be found in checklists or standard operations. Teaching is about conscientiously building a learning community in a distinct classroom, in a unique school, in a particular neighborhood. This is a complex relational challenge, requiring a wide humanistic and technical skillset; with little in common with medical checklists, sutures, or knot tying. No amount of misplaced medical research terminology, statistical sifting, or wishful thinking can make it otherwise. Unfortunately, in Hattie's scheme, educational intent is rewritten as an exercise in assessment data production and improvement, where claimed "best practices" guide policy and practice. Other conceivable purposes of education fade as "how to" strategies for continuous score improvement replace an earlier era's higher educational aspirations.

In measurement obsessed systems, a mode of regulation called "performativity" (Ball, 2003; McKnight & Whitburn, 2020) emerges. Here, measurable, observable outputs represent an individual's worth, and teachers are pressured to produce endless evidence of their practice. Working in highly managed, performative systems takes a negative toll on the psyche of teachers employed in them (Ball, 2003; Jesson & Simpkin, 2007; Lilley, 2022; Wescott, 2022). When a school district decides to invest in *Visible Learning* programming, teachers become data points and data producers, forced to act in prescribed ways, that are often at odds with their own judgement (Lilley, 2022). Students become future test scores who must be made "assessment capable" (Frey et al., 2018) through teacher "clarity" (Almarode & Vandas, 2019) or better "feedback" (Hattie & Clarke, 2019). Prescriptive teaching ceases to be an ethical, relational profession. Schools are recast as tightly managed franchises, staffed by teacher technicians, delivering a checklist of best practice teaching strategies.

In Australian districts where High Impact Teaching Strategies (HITS) (Lilley, 2022; Wescott, 2022) based on *Visible Learning* have been implemented, teachers are forced into simplistic performative technical actions such as writing the topic of a class on the board before beginning a lesson. Teacher autonomy, enjoyment of the profession, and collegial professional

development decrease (Lilley, 2022) as "evidence based best practices" replace the trust that once existed in their professional decision making.

Visible Learning is a dubious mishmash of research of unknown quality, statistical juggling, and the author's self-assured opinion. There is little mention of creativity, democratic values, community building, sustainability, personal growth, health, or the pursuit of happiness. According to *Visible Learning*, teachers should be panoptically regulated technicians, adhering to prescribed "best practices" determined by an outside authority. This vision serves agendas benefitting from recasting teaching as a technical task best regulated through the dehumanizing tenets of scientific management and its associated surveillance.

Narratives of Neoliberalism: Seeing Economic Motivations

A great experiment in neoliberal educational reform occurred in New Zealand beginning in the early 1980s (O'Neill, 2015). In 1989, the education system there underwent a "devolution," which changed aspects of its public educational boards into private companies (Jesson & Simpkin, 2007; Openshaw, 2014) called education service centers (ESCs). ESCs competed in a semi-open market system to provide their former (civil) services to schools. The transport and payroll divisions of the former Auckland school board became an ESC called *Multiserve*, later renamed *Cognition Education* (Bates, 2017; O'Neill et al., 2016). Motivated by profit, ESCs diversified their offerings. *Cognition Education* is a for-profit company wholly owned by the charitable *Cognition Education Trust*. Hattie has been involved with *Multi Serve/Cognition* since before the commercialization of *Visible Learning*: "In 2006, Hattie became a director of the Multi Serve Education Trust Board. In 2008, he became a director of the rebranded Cognition Education" (O'Neill et al., 2016). A business arrangement between Hattie and the *Cognition Education* company to commercialize *Visible Learning* was negotiated (O'Neill et al., 2016) soon after the publication of the book. Terry Bates, former CEO of Cognition education writes:

> …John Hattie, then an academic at the University of Auckland and also a member of the Cognition board, had approached the company looking for a new home for the nascent commercial platform that had been developed out of his landmark meta-analysis of impactful teacher practice, *Visible Learning* (VL), published two years earlier" (Bates, 2017, p.59).

This partnership led to *Visible Learning*^{plus} of which: "The key focus was converting the critical principles of the VL research to a graduated professional learning curriculum (targeted at teachers and school leaders) that could be modularised and sold as such. In return Hattie received a royalty on all VL-related income" (Bates, 2017, p.59).

Visible Learning^{plus} was licensed to various partners on different continents to maximise the reach of V*isible Learning* and the speed with which it could be disseminated. He continues, "from a standing start in early 2011, …. VL achieved just short of $2M in revenue" (Bates, 2017, p.59) and that rose to $2.7M the following year.

The partnership seems to have been mutually lucrative. O'Neill (2016) reports the third-party payments made by *Cognition Education* to Hattie (see table below) in addition to director's fees that he received as a member of the *Cognition Trust* board.

Table 4. Third party payments from Cognition Education to John Hattie 2010-2015

Year	2010	2011	2012	2013	2014	2015
$NZ	m	10,000	93,322	272,133	270,559	223,439

(O'Neill et al., 2016, p.48)

Hattie's continued membership on the board of the charitable *Cognition Trust* while *Cognition Education* commercialized his work is notable. If not a conflict of interest, the optics are at best ambiguous, and if nothing else, the arrangement certainly highlights Hattie's ambitious entrepreneurial spirit.

O'Neill's (2016) comprehensive analysis of the interrelationships and intersections between various actors, companies, and interests in New Zealand, and internationally, reveals an insightful portrait of deregulated educational systems. If the opportunity to profit in education is provided, various enterprising actors begin to orbit, attempting to exert influence beneficial to their interests (Barkan, 2012; O'Neill et al., 2016; Phelps, 2018). It is not clear how many public dollars around the world have been diverted to *Visible Learning* products since 2009, but *Corwin*, which purchased *Visible Learning*^{plus} in 2018 (Corwin, 2018), has an estimated revenue of 50 million dollars annually[2], while its parent organization, the SAGE group earns many times that.

Hattie's (2009) *Visible Learning* appeals to educational policy makers, managers, and educational reformers supportive of what Sahlberg (2012) terms the Global Education Reform Movement (GERM). The GERM is representative of a neoliberal ideology that seeks to increase privatization, reduce regulation, and apply marketization to all facets of society, including education (McKnight & Whitburn, 2020; Sleigh, 2021; Tuck, 2013). GERM is promoted by conservative think tanks, some corporations, and partisan political lobbies (Barkan, 2012; Ryan, 2017). A tactic of neoliberal reformers is to underfund public systems, and then blame inefficiency, laziness, and incompetence as systems fail. Accountability demands (like assessment improvements), and funding cuts are often simultaneously imposed, creating an untenable working situation. This results in service declines and creates chaos within systems. As the public outcry grows, "limited" privatization is proposed, in the name of rescuing systems in crisis, more choice, and better "value for money" (Klees, 2020; Parker, 2017; Tuck, 2017). In this manner, neoliberal governments slowly recuse themselves financially from responsibility to the public sphere. Evidence of the slow starving of education systems is noticeable as student teacher ratios increase, public-private partnerships spring up, fundraising to make up shortfalls is normalized (Yoon, Young & Livingston, 2020), corporate sponsorships grow, and internationalization programs are promoted (Elnagar & Young, 2021; Trilokekar & Tamtik, 2020).

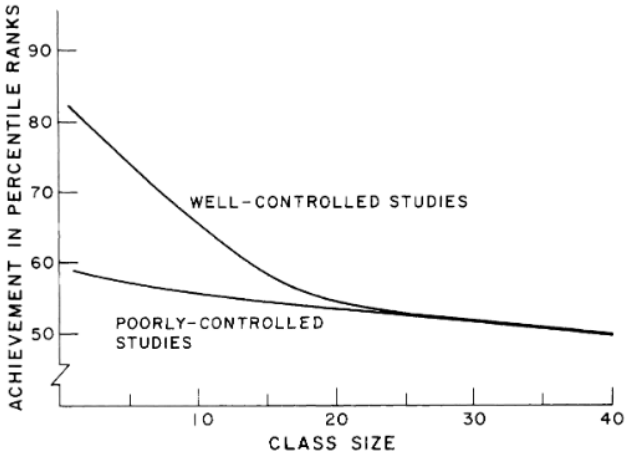
With the neoliberal agenda in mind, it is instructive to consider Hattie's (2009) treatment of the "class size" effect. Historically, funding cuts and austerity policies drive class sizes up while teachers and their unions lobby for class size limits. Hattie (2009) attempts to close that debate in *Visible Learning*. He finds little effect to assessment outcomes due to class size, reporting the effect size as d=0.21. It sits at 108th on the effect size ladder. Performing a word frequency analysis, we find "class size" is mentioned an outsized ninety-five times in the book. "Class size" then, is

[2] https://growjo.com/company/Corwin_Press [https://perma.cc/6VPK-483A]

referenced almost 1600% more than the top effect of "self-reported grades," which can be found only 6 times. The class size topic is revisited in at least sixteen sections of the book. Hattie makes it abundantly clear that his findings show that "class size does not matter" and provides the empirical research (Hattie, 2005, 2009) to close debate.

Were we to unquestioningly accept that Hattie's calculations were completely airtight concerning achievement, common sense would dictate that there may be consequences beyond achievement worthy of consideration. Surely an honest investigation into the effects of increasing class size should include the qualitative experiences of teachers and students in large and small classes. O'Neill, (2012) makes this point in an open letter opposing planned class size increases in New Zealand based on Hattie's work. Effects beyond the reach of empirical measurement could conceivably include more one on one-time, better classroom community building, improved working conditions, and other long-term societal benefits invisible to standardized assessments.

The class size effect of d=0.21 results from Hattie's synthesis (averaging) of three input meta-analyses. Because it is an emphasized finding, and highly controversial, it deserves extra investigation. Glass, the inventor of the meta-analysis technique (Glass, 1976), co-created the first meta-analysis on class size ever done (Glass & Smith, 1979). That study is by far the largest of the three "class size" meta-analyses used in *Visible Learning*. Glass and Smith (1979) included the following graph:



(Glass & Smith, 1979, p.15)

Visible Learning extracts an effect size of d=0.09 (Hattie, 2009, Appendix A) from this study, but this is not a value that Glass and Smith (1979) report themselves. This small effect in fact seems at odds with Glass and Smith's (1979) own interpretation:

> Taking all findings of this meta-analysis into account, it is safe to say that between class sizes of forty pupils and one pupil lie more than 30 percentile ranks of achievement… …There is little doubt that, other things equal, more is learned in smaller classes. (Glass & Smith, 1979, p.15)

Although Glass and Smith (1979) show that size reductions correlate to an improvement in achievement, *Visible Learning* assigns it only d=0.09, the lowest value of the three included (d=0.34 and d=0.20 being the others). It is unclear how this value was derived from their work as

it does not appear there (possibly only the far-right hand tail of the graph was considered). Opaque data extraction has been noted elsewhere. Regarding a synthesis of meta-analysis on feedback (Hattie & Timperley, 2007), See (2018) remarks, "how Hattie arrived at the effect sizes that he did in his paper was not explained" (p.102).

Glass (1979) describes one type of common class size experiment (done at the undergraduate level) which compared lecture hall classes of 100 or more to those of around 20. No significant difference in final exam scores were seen. Hattie (2009), benchmarking 80 as a large class and 20-30 as small, states that "… lack of outcome difference is most likely because teachers do not change their current teaching strategies…" (p.88) in small classes. However, it is not made clear to the reader whether this statement is based on college level data of the type Glass discusses. Of note, in OECD countries, it would be unusual to find K-12 class sizes larger than 80[3]. If college findings are indeed being applied to K-12 education, we view it as a dubious stretch; there is little in common between a university lecture hall and an elementary classroom.

As a further example of the importance of context, class size data from California, which underwent "the largest "experiment" in class size reduction in the country's history" (Schrag, 2006, p. 229) deserves consideration. In 1996, after battling the teacher's union over class size, California's governor "…determined to make them swallow what they'd asked for" (Schrag, 2006, p.232) mandated K-3 classes be reduced by a third almost overnight, at the cost of a billion dollars a year. There were not enough trained teachers or facilities to manage such a reduction so quickly (Turley & Nakai, 1998). An army of hastily trained permit teachers were put in front of California students, many in portable classrooms. It is unsurprising that achievement did not instantly improve. California's results, taken out of context (Jepsen & Rivkin, 2002), can provide "empirical evidence" that class size reduction mandates are an expensive failed policy (Hanushek, 2012). Hattie's (2009) statement, "… (it is) certainly not worth the billions of dollars that is required to reduce the number of children per classroom" (p.86) could very well be informed by the California experiment; empirically "true", but *contextually inapplicable* to the average classroom.

Hattie (2005) discusses California in some detail in an earlier synthesis on class size where the effect size for reducing classes is reported as d=0.13. There he synthesized 14 meta-analyses (11 more than were included in *Visible Learning*). Oddly, a chart of the 2005 data *is* shared in *Visible Learning* (Hattie, 2009, p.87). Why a difference in chosen meta-analyses and the difference in effect size between 2005 and 2009's *Visible Learning* is unknown, but the change illustrates the plasticity of calculated effect sizes owing to the author's research decisions. We concur with See (2018), Bergeron and Rivard (2017), and others, that the numbers produced by Hattie's technique ought to be approached with caution.

Despite Hattie's (2009) occasionally hedging language such as "…although the positive sign of the average effect size suggests that increasing class size is poor policy" (p.88), ultimately "class size doesn't matter" is the story being told, and the one its fans have chosen to believe. It has endeared Hattie to education finance departments, managers, policy makers, and reformers, ensuring the brand's strong sales and a continued presence in education.

[3] https://www.oecd-ilibrary.org/sites/e2f6a260-en/index.html?itemId=/content/component/e2f6a260-en#:~:text=On%20average%20across%20OECD%20countries,23%20in%20lower%20secondary%20educatio [https://perma.cc/6K25-LTLB]

The Cargo Cult Science of *Visible Learning*

The professional scientist of the 19th century blended empirical evidence, experimentation, mathematics, and rational thought to exert "power and dominion over nature" (Aikenhead, 2005, p.12). World War Two married the previously distinct arts of abstract science and technology to aid war efforts on both sides.

> This unlikely marriage between science and technology produced a new social institution, research and development (R&D)… Scientists and engineers still strive for power and dominion over nature, but mostly as R&D and in a new social context where technology, values, corporate profits, national security, and social accountability play an increasingly important role. (Aikenhead, 2005, p.12)

Corporate scientists and engineers moved from R&D into management positions where their technical mindset influenced corporate culture (Barnes, 1985; Noble, 1978; Pinch & Bijker, 1984). As corporations gained economic power, corporate leaders were afforded large amounts of political influence. The R&D rooted technological determinism, managerialism, social engineering, and free-market ideas of the corporate world influenced political thought and became foundational ideas of neoliberalism. Business ethics have subsequently been imposed onto institutions formerly considered as public goods (Barnes, 1985; Biesta, 2007; Noble, 1977; O'Mahony, 2017; Tuck, 2013; Wescott, 2022).

A phenomenon called scientism arises from the desire to emulate the success of the physical sciences in new arenas. Scientism can be summarized as the glorification and subsequent imprudent application of scientific methods outside their original scope (Gasparatou, 2017; Hayek, 1942; Ross et al., 2018; Sergiovanni, 1989). Hallmarks of scientism include reductionism (Hayek, 1942; Sergiovanni, 1989), and the overvaluing of empirical data (O'Mahony, 2017).

Scientism often begets *pseudoscience*, the presentation of unscientific approaches as if they were scientific (Bergeron & Rivard, 2017; Haack, 2007; Sleigh, 2021). The famous physicist Richard Feynman (Feynman, 1974) called this "cargo-cult" science; something that looks and feels like science but lacks the *epistemic conscientiousness* (Moberger, 2020) of true science. Feynman explains the pains that scientists go through to avoid falsity "I'm talking about a specific, extra type of integrity that is not lying, but bending over backwards to show how you're maybe wrong, that you ought to do when acting as a scientist" (Feynman, 1974, p.12). He continues:

> I think ordinary people with commonsense ideas are intimidated by this pseudoscience. A teacher who has some good idea of how to teach her children to read is forced by the school system to do it some other way – or is even fooled by the school system into thinking that her method is not necessarily a good one. (Feynman, 1974, p.10)

Feynman's words from the past could easily apply to *Visible Learning* products (and many other educational "magic bullets," past, present, and future).

Hattie (2009) attempts to bolster the scientific credibility of his work by referring to it as a theory, and by quoting famous philosopher of science Karl Popper:

> Bold ideas, unjustified anticipations, and speculative thought, are our only means for interpreting nature: our only organon, our only instrument, for grasping her. And we must hazard them to win our prize. Those among us who are unwilling to expose

> their ideas to the hazard of refutation do not take part in the scientific game. (Popper, 1968 as cited in Hattie, 2009, p. 4)

Ironically, with fallibilism, Popper was attempting to differentiate between science and *pseudoscience*, illustrated by comparing Freud to Einstein. Einstein's theories made predictions that could be shown false by experiment while Freud's interpretations could always be revised in the face of new evidence. Whatever one thinks of fallibilism (Kuhn, 2012; Maxwell, 1972; Perkinson, 1978; Sleigh, 2021), Popper was certainly not implying that science consists of making completely unfounded claims for others to disprove.

In an interview a decade after the publication of *Visible Learning* Hattie states that "...no one has contested the explanation, the interpretative *Visible Learning* theory. That is when it's going to be exciting: when someone presents a different explanation" (Toscano & Hattie, 2018, p.93). As far as we can tell *Visible Learning* presents no theory capable of experimental falsification. It uses a proprietary, unvetted methodology, and went straight to commercial publication. Criticism of it is found in journals, but these are far from the public eye. *Visible Learning* is a product that exists in the marketized world of educational gurus (Eacott, 2017) and magic bullet fads. This is far from the tradition of careful experimentation and peer review.

Phillips (2014) argues that the astounding progress of the physical sciences has come by the fact that they make "…precise predictions that can then be subjected to empirical verification or refutation" (p. 10). Unfortunately, the methods of a physics laboratory do not transfer to the multivariate educational environment of a classroom. Phillips states, "…very little research in education can be regarded as being of high quality if the making of precise predictions (comparable to those made in the lab of a Nobel laureate in physics) is a key criterion…". He goes on to explain that in the physical sciences variables can be controlled, but in school settings, these variables are "not nuisances but are of great human and educational significance—control here removes all semblance of ecological validity" (Phillips, 2014, p.10). Students are diverse in their identities, histories, and social contexts, making classrooms—and therefore teaching—a complicated human interaction. As Eisner (1983) once stated, education is a "…dynamic and complex process of instruction yield(ing) outcomes far too numerous and complex to be specified in behavioral and content terms in advance" (Eisner, 1983, p.554).

The expanded *Visible Learning* database, branded *Meta*^{x4} presents itself as a typical scientific data set, with little elaboration on the source of its numbers. Effect sizes appear to represent neutral, scientifically valid measures of educational variables. *Meta*^{x} thus dehumanizingly frames classrooms as data producers, in the mold of R&D labs at work on practical problems. Problematically, users of *Meta*^{x} are unlikely to be aware of the source of its numbers, the bias contained in them, the nuance those numbers hide, and ultimately, of the *scientistic* and entrepreneurial reasons those numbers exist in the first place.

In education the devil in is in the details; details found in the complex, unmeasurable ebb and flow of classroom life, and in the social, economic, and political contexts that surround them. These details are infinite in number and cannot be completely deduced, mapped, or modelled. Yet, *Visible Learning* purports to have done just that: reducing the irreducible and prescribing the un-prescribable. It is a product of, and caters to, an impoverished neoliberal educational paradigm. It is positivistic in an infinitely varied humanistic arena not suited to positivism. It is philosophically

[4] https://www.visiblelearningmetax.com/Influences [https://perma.cc/KU74-8KKT]

commensurate with modern business ethics and an R&D conception of science. It promises simple, cheap, classroom level fixes to manufactured alarm surrounding achievement scores. *Visible Learning* disregards the grander notions of what education should be, dismisses the wisdom of the people engaged in the practice of it, and minimizes the larger stories surrounding it.

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Authors

Greg Johnson received a master's degree from the Department of Curriculum, Teaching and Learning at the University of Manitoba. He is a practicing physics teacher and science curriculum consultant. His research interests are in technology mediated education, science education, curriculum theory, and curriculum design. https://orcid.org/0000-0003-2839-1907

Melanie Janzen is an associate professor in the Department of Curriculum, Teaching and Learning at the University of Manitoba. Her research is informed by critical and feminist post-structural perspectives, with a central focus on exploring the inter-related workings of power and discourses, particularly as they relate to the identities of teachers and children. https://orcid.org/0000-0003-2881-3436

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