

LITERATURE REVIEW

Why is there so much resistance to Direct Instruction?

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Direct Instruction has been the subject of empirical research since its inception in the 1960s and has garnered a strong research base to support it. Despite its proven efficacy, Direct Instruction is not widely implemented and draws much criticism from some educators. This literature review details the components of Direct Instruction, research to support it and reported attitudes towards it. The aspects of Direct Instruction that attract the most criticism are broken down to determine just what it is that educators do not like about it. In addition, this review attempts to outline possible ways to improve the landscape for Direct Instruction by reviewing research on how best to achieve a shift in beliefs when adopting change in schools. This includes pre-service teacher education and professional development and support for practising teachers as a means of improving rates of implementation of Direct Instruction.

A large volume of research data exists to support the efficacy of Direct Instruction in both special and general education settings. The reality, however, is that the application of Direct Instruction is not widespread (Bessellieu, Kozloff, & Rice, 2001, p. 14; Hemenstall, 2013, 'Why does DI evoke such rancour', para. 2; Kim & Axelrod, 2005, p. 112; Lindsley, 1992, p. 21; Vitale & Kaniuka, 2009, p. 14; Watkins, 1995, 'Funding Decisions', para. 4). The purpose of this literature review is to explore Direct Instruction in detail and break down some of the reported reasons for its lack of support among the wider education community. In addition, it will explore suggestions for achieving improved rates of implementation and attitudes towards Direct Instruction.

Articles were located by conducting a search of the Education Resources Information Center (ERIC), PsycInfo and A + Education databases, in addition to Google Scholar. Each database was searched using the descriptor 'direct instruction' in addition to combinations of 'direct instruction' with the following additional terms: attitude, acceptance, resistance, implementation and social validity. 'Scripted instruction' was also combined with the previous terms to maximise the number of relevant articles returned. No date limits were used when initially searching the databases; however, more recent articles were reviewed first in order to capture the most current data. An Internet search to locate professional organisations related to Direct Instruction was completed using the Google search engine, and this uncovered leads to additional articles. In addition, the reference lists of relevant articles were examined to locate additional resources that may not have been found in the database search. Articles were prioritised when they included empirical data on either implementation, efficacy, or teacher ratings of Direct Instruction. Since there were limited articles that included empirical data on teacher ratings and attitudes, qualitative and descriptive research on this area were also considered for inclusion.

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Direct Instruction or direct instruction?

It is important to note that there is some variation in terminology regarding Direct Instruction, specifically, the difference between what is sometimes referred to as ‘little’ direct instruction (di) (using lower case letters) and ‘big’ Direct Instruction (DI) (using capital letters). The pioneering Direct Instruction (DI) programs came from the work of Siegfried Engelmann, an early childhood educator, and his colleagues (Magliaro, Lockee, & Burton, 2005, p. 42). Engelmann wanted to eliminate the notion that student failure was the result of something inherently deficient in the child (Engelmann, 1967, p. 99, 1980, p. 29). Quite simply, if the child has not learned after instruction, it is the result of inadequate teaching, not the child’s innate capabilities. Engelmann emphasised that all children can learn if instruction is designed independently of learner characteristics. That is, the focus is on *what* is being taught rather than *who* is being taught (Engelmann, 1980, p. 35). Engelmann (1980) specified key instructional variables that place responsibility for child learning on the teacher, under the premise that faultless instruction would result in maximum student learning (p. 30). This, he theorised, could be achieved by breaking tasks into small steps using task analysis, through explicit teacher-led instruction and teaching at a brisk pace (Engelmann, 1967, p. 99).

Since the 1960s, there have been many programs created which are predicated on this instructional design, such as Reading Mastery, Spelling Mastery and Corrective Reading. These programs are typically referred to as DI (using capital letters), while instructional practices consistent with what happens in these programs, but not specific to a program (often published commercial programs), are referred to simply as ‘direct instruction’ (lower case) (Gersten, Woodward, & Darch, 1986, p. 18; Kame’enui, Jitendra, & Darch, 1995, p. 8; Proctor, 1989, p. 40). DI programs follow a script and predetermined curriculum. In contrast, ‘direct instruction’ can be implemented using any curriculum resource, not just an exclusively designed program. It refers specifically to the teaching strategies implemented, such as teacher-led instruction using explicit language. An example of ‘di’ appears in the book, ‘Direct Instruction Reading’ (Carnine, Silbert, Kame’enui, & Tarver, 2010). In essence, both DI and ‘direct instruction’ may look the same, but the difference lies in the predetermined scope and sequence of the content that is being taught (Kame’enui et al., 1995, p. 8). DI involves an all-encompassing curriculum, building on skills cumulatively throughout the course of the program and is based around a predetermined mastery criterion and outcomes. On the other hand, direct instruction can be implemented ‘ad hoc’, to any lesson, without connection to previous or future lessons (Gersten et al., 1986, p. 18).

Throughout the literature, the term explicit instruction is sometimes used in place of direct instruction (di), as these two terms have come to share the same meaning. They are concerned with teaching behaviours and the resultant academic learning of the student (Baumann, 1988, p. 713; Gersten et al., 1986, p. 18; Kame’enui et al., 1995, p. 7; Proctor, 1989, p. 40). The fact that these two terms are interchangeable demonstrates that different researchers have, after separately reviewing research on effective instruction, arrived at the same conclusions. While definitions of di vary there is consistency in the description of core elements. That is, it refers to instruction that is teacher directed, has an academic focus, is goal oriented, and requires deliberate implementation (Gersten et al., 1986, p. 17; Kame’enui et al., 1995, p. 7; Kim & Axelrod, 2005, p. 114). Perhaps most recognisable in any definition of explicit or direct instruction is the use of demonstration, guided practice then independent practice (Baumann, 1988, p. 714; Gersten et al., 1986, p. 18; Proctor, 1989, p. 41), also known as ‘I do, we do, you do’.

It is important to acknowledge that while DI is the specific branch of di most often attributed to the work of Sigfried Engelmann, Douglas Carnine, Carl Bereiter and their colleagues, other researchers are also credited with bringing attention to this instructional technology. Most notably, Rosenshine is recognised as publishing the earliest ‘definition’ of di (Gersten et al., 1986, p. 17; Kame’enui et al., 1995, p. 6) and has refined his definition over the years (p. 7). Rosenshine was most concerned with an emphasis on teaching behaviour and student achievement and less on curriculum design (Baumann, 1988, p. 714; Kim & Axelrod, 2005, p. 113). Put simply, all DI is explicit and direct, but not all explicit instruction or direct instruction is DI.

Regardless of the distinction between DI and di, training and experience in DI equips educators to use explicit and direct teaching methods beyond the DI curriculum. In this way, DI could be viewed as an instructional stepping stone for practitioners to become more direct and explicit during less-specific learning opportunities.

This review will focus on Direct Instruction or DI: those programs that have been specifically designed for publication so that they may be implemented as a complete curriculum.

What is Direct Instruction?

DI is an instructional technology based on creating a structured teaching environment in which concepts are taught and related using an explicit format driven by student mastery (Gersten et al., 1986, p. 29; Magliaro et al., 2005, p. 41). A number of features are typical of DI programs: a predetermined skills sequence, cumulative progression along the skill hierarchy, scripts to dictate lesson content, active student participation, fast pace, positive reinforcement and unison responding by students in response to some type of visual or verbal signal from the teacher (Kame’enui et al., 1995, p. 12; Kim & Axelrod, 2005, p. 114). It is these characteristics that create the overall ‘package’ of DI. The skill sequence of a DI program is formulated by conducting a specific task analysis of the identified objectives, which is then organised so that the skill can be taught in a logical sequence. As sub-skills are mastered, they are connected with new skills that allow for a manageable progression towards the broader goal of the program (Kim & Axelrod, 2005, p. 114). By adhering to these principles, students are not just learning isolated facts by rote, they are building meaningful connections between what they know and what they need know to ensure students are mastering essential early skills before tackling broader or higher order skills (Gersten et al., 1986, p. 29; Magliaro et al., 2005, p. 41). A scripted format removes the onus of curriculum decisions from the teacher so that they can instead focus on instructional delivery and student success (Magliaro et al., 2005, p. 45). Unison responding allows the teacher to monitor all students in the group simultaneously, with opportunities for individual responding interspersed throughout lessons. Combined with a high pace of delivery, unison and individual responding precipitates high rates of student engagement, resulting in rates of 3–20 responses per student, per minute (Kim & Axelrod, 2005, p. 114). Corrective feedback allows errors to be addressed *immediately*, with teacher modelling and reinforcement providing an ongoing ‘model’ for learning the skill (Becker & Gersten, 1982, p. 76; Hempenstall, 2013, ‘Characteristics’, para. 4) without rehearsing errors (Adams & Engelmann, 1995, p. 14).

Each program has its own specific placement test to determine suitable entry points for individual students, thereby altering the level of content according to an individual’s commencement point. Fluidity between groups can then accommodate varying rates of progress within a whole class or grade level (Kim & Axelrod, 2005, p. 114). Sensitivity to

individual rates of progress within lessons can be achieved by varying the amount and type of teacher correction and rehearsal for individual students throughout each lesson (Gersten et al., 1986, p. 18).

The premise behind DI is that an instructional sequence can be created based on research, with careful attention paid to sequencing skills so that students learn skills in a linear and cumulative way, with built-in maintenance and mastery checks along the way (Adams & Engelmann, 1995, p. 15; Gersten et al., 1986, p. 19; Kame'enui et al., 1995, p. 13). This careful attention to task analysis and skills sequencing aims to produce what Engelmann (1980) termed 'faultless instruction' which can then be packaged as a program in a simple to follow format available to be adopted by the wider teaching population (p. 35). This removes the need for teachers to formulate a skill hierarchy and produce additional resources, assessment tasks and data collection. The use of a teacher script to specify what the teacher is to say and do, as well as how students are expected to respond is necessary to maximise program adherence and subsequent success for both the teacher and students (Gersten et al., 1986, p. 18). In order to retain the integrity of the program, teachers need to be committed to implementing it as it was intended. The program is designed for use as a complete unit, not as part of an eclectic selection of resources and elements, with only parts of the sequence being used (Snider & Schumitsch, 2006, p. 27).

In addition to these elements of instructional design, a key principle of DI is that all students can learn (Adams & Engelmann, 1995, p. 3). DI is intended to transcend categorisation labels and simply apply effective instructional design to maximise learning for all students (Engelmann, 1967, p. 95). This extends to seeing any lack of progress in student learning as a failure in teaching, not as a result of some characteristic of the student that has prevented them from learning (Snider & Schumitsch, 2006, p. 29). This is consistent with a non-categorical approach whereby the focus is on teaching and learning, rather than a diagnosis or perceived limitations (Wheldall, 1994, p. 45). With these elements in mind, DI programs undergo intense scrutiny to reach the final, published sequence, to ensure that the instructional sequence includes adequate practise of the predetermined skills to reach mastery, that the teacher script is sufficiently clear and easy to follow, and that students are engaged at an appropriate instructional level (Gersten et al., 1986, p. 18; Kim & Axelrod, 2005, p. 115).

Who is DI for?

While more widely known for its success in teaching economically disadvantaged students, strong empirical evidence has been reported to support the use of DI to teach a diverse range of populations. These include students with physical or intellectual disabilities ranging from mild to severe (Gersten et al., 1986, p. 28; Lockery & Maggs, 1982, p. 286; White, 1988, p. 365), students learning English as a second language (Lee, Ajayi, & Richards, 2007, p. 21; Reeves, 2010, p. 242) as well as typically achieving and high achieving students (Adams & Engelmann, 1995, p. 29). The successful results achieved from using DI to teach students in these populations have been replicated in varied settings and across a large span of age ranges, demonstrating its efficacy from pre-school age right through to high school students (Kim & Axelrod, 2005, p. 115; Lockery & Maggs, 1982, p. 286). At the time of DI's inception, there was an over-reliance on disability labels that typically resulted in reduced expectations of student achievement and thus a limited curriculum. DI, however, employed a curriculum that did not differentiate based on disability, but rather on the content to be taught (Engelmann, 1967, p. 94). As a result, there is a large and growing body of evidence demonstrating the success of DI to

teach a wide-ranging repertoire of skills to an equally varied range of student populations (Adams & Engelmann, 1995, p. 97; Lockery & Maggs, 1982, p. 282).

Equally important to the success of using DI to teach academic skills are the outcomes achieved when DI has been used to teach functional skills to students with special needs. Acquiring skills such as crossing the street and using an Automated Teller Machine (ATM) provides individuals with increased independence and participation in the community (Gersten et al., 1986, p. 29), while validating the utility of DI beyond the classroom setting.

What Can be Taught Using DI?

DI has been applied to a variety of academic skills, in addition to applications to less academic and more unexpected pursuits such as religious studies and social skills. However, the DI programs most commonly in use are largely focused on aspects of reading and related instruction, along with mathematics (Kim & Axelrod, 2005, p. 114; Lockery & Maggs, 1982, p. 270). These particular areas lend themselves to instruction using DI programs and principles because of the widely accepted sequence of skills required to cover the necessary content in these areas. For example, the National Inquiry into the Teaching of Literacy (Department of Education Science and Training [DEST], 2005) recommended that literacy instruction should focus on five main areas: phonemic awareness, phonics, fluency, vocabulary and comprehension (p. 16). With these necessary, specific skills already agreed upon, an instructional sequence could be created based on breaking those skills down. Referring to the principles of DI described previously, the component skills can be incorporated into a variety of teacher-led activities with inbuilt review to monitor student progress and mastery. The result is virtually a pre-packaged curriculum. This end result can be seen in some of the more commonly known DI programs in use today, such as Reading Mastery (previously known as DISTAR), Spelling Mastery and Corrective Mathematics. These particular programs have been in circulation for many years with empirical research spanning their eras.

Lockery and Maggs (1982) documented the success of DI for children who have learning difficulties, are gifted, come from disadvantaged backgrounds, who have intellectual impairments ranging from mild to severely impaired, and who are 'normal' students in mainstream classes (p. 270). Their analysis of research on DI across a 10-year period makes a convincing case for the application of DI to teach skills such as language, reading, mathematics and computers to any of the included populations of students (p. 286).

While there is evidence to support the teaching of a variety of skills using DI, there is no suggestion that DI should replace all other instructional methodology. In fact, research suggests that there are times when DI is the most effective way to teach, and other times when it is not compatible (Baumann, 1988, p. 716). Therefore, it is not suggested that an entire school day be comprised of DI lessons.

Does DI work?

DI has long been the subject of empirical analysis, typically investigating the efficacy of an individual program to produce results in a defined area of student learning. For example, Lockery and Maggs (1982) included studies that investigated the success of Morphographic Spelling for Aboriginal children with learning difficulties (p. 271), reading achievement of students with Down Syndrome after instruction with DISTAR (now

known as Reading Mastery) (p. 274) and other specific investigations in their analysis on DI research in Australia. They concluded that repeated replication of the success of DI when used with varied populations, a range of ages and for different learning areas shows its suitability as an effective intervention for all students (p. 284).

In the USA in 1967, a large-scale research project was conducted – Project Follow Through, to investigate the effectiveness of available instructional methodology in order to identify ways to address consistently low achievement amongst disadvantaged students. This project is touted to have been the most comprehensive (and expensive) review of education ever undertaken, encompassing schools from 170 communities and totalling approximately 70,000 students (Carnine, 2000, p. 4; Kim & Axelrod, 2005, p. 112). Of the instructional models compared, DI consistently delivered the highest results across a number of categories (Kim & Axelrod, 2005, p. 112). Of particular interest was the finding that DI returned the highest results in areas such as self-esteem and higher order skills such as conceptual thinking, outperforming teaching models specifically oriented towards increasing those skills (Adams & Engelmann, 1996, p. 97). Overwhelming support across a variety of domains encompassing not only basic skills but higher order cognitive achievement and affective outcomes refute claims that DI is effective only for rote, drill and practice learning. These results demonstrate the capacity for DI to increase both academic performance and self-esteem. Furthermore, longitudinal studies demonstrated that the gains made during the implementation of DI in early primary grades were maintained through to later primary and beyond (Becker & Gersten, 1982, p. 83; Kim & Axelrod, 2005, p. 115), with DI students outperforming their peers who had not received DI (Bessellieu et al., 2001, p. 14; Meyer, 1984, p. 388). Interestingly, despite DI demonstrating significantly more impressive results than any other instructional method, it was not singled out as a recommended model. Instead, the department of education simply endorsed all models included in the review, despite the disappointing results of some (Kim & Axelrod, 2005, p. 112).

In the time since Project Follow Through, studies have been regularly published regarding the effectiveness of DI. To get a more comprehensive overview of the research, there have been some meta-analyses to compare the overall efficacy of various instructional technologies, one of which is DI. Borman, Hewes, Overman, and Brown (2003) analysed data on 29 instructional methods, and subsequently rated them according to the quality of the evidence to support their efficacy. DI was one of only three methods to rank in the highest category ‘Strongest evidence of effectiveness’ (p. 155). Not surprisingly, DI was also the subject of the largest number of studies included in the analysis, further evidence to indicate the intense scrutiny to which it has been subjected. White (1988) investigated studies comparing DI with other teaching methods when teaching students with mild to moderate intellectual disabilities. In his meta-analysis of 25 studies, DI was found to be significantly more effective than any comparison treatment (p. 367) with reported effect sizes as high as 1.94. In a broader analysis, Hattie (2009) synthesised more than 800 meta-analyses related to classroom achievement. Of particular interest was the contrasted results of teacher-led with learner-led approaches where teacher-led approaches were found to be significantly more effective (p. 243). In particular, DI ranked much higher than inquiry-based methodologies with regards to teaching effects (p. 201).

Lockery and Maggs (1982) alluded to the potential for DI to be a cost-effective model to meet the range of student needs in the classroom. When reflecting on the results of their analysis, they concluded that DI has the potential to minimise the number of students experiencing failure and who would otherwise go on to need specialist, more labour-

intensive intervention (p. 284). This suggests that schools could potentially save money that would otherwise be spent on future remedial programs for students, by simply implementing DI to prevent failure in the first place.

Areas of Resistance

It is clear from the ‘Does DI work?’ section that DI has enjoyed a history of strong empirical confirmation of its efficacy. The problem, however, is that its popularity and subsequent implementation have not enjoyed such support (Kim & Axelrod, 2005, p. 112). Despite Project Follow Through demonstrating that DI was a superior model of instruction, many schools continued to use the very methods and programs that had been shown to be largely ineffective for their students (Watkins, 1995, ‘Funding Decisions’ section, para. 4). So, with all of this evidence to support DI, why do teachers reject or avoid it? In a time where teachers are often so burdened with competing demands, why would one choose to exchange an easily implemented, proven methodology with one that requires more preparation and resources, with less than impressive results? Some research suggests that it is the result of a profession largely dedicated to a student-directed or inquiry-led philosophy (Kim & Axelrod, 2005, p. 112; Snider & Schumitsch, 2006, p. 18). As a result, there is a disparity in the philosophy of educators and the methodology recommended as an evidence-based practice.

Some studies specifically investigated teacher attitudes towards DI using survey techniques (Bessellieu et al., 2001; Blakely, 2001; Demant & Yates, 2003; Lee et al., 2007; Proctor, 1989; Snider & Schumitsch, 2006; Vitale & Kaniuka, 2009). Most employed a rating scale with subsequent statistical analysis of responses to draw conclusions about teacher attitudes; however, some surveys employed open-ended questions, resulting in a summary of verbatim statements with no empirical basis. The instrument used in each study was unique, with no studies reporting reliability measures. Some studies included analysis of respondents’ demographic information to extrapolate further detail of respondents’ attitudes. The studies examined for this review generally included a small to moderate sample size, targeting respondents from multiple schools or districts.

A number of specific reasons are cited as to why teachers do not like or do not use DI. Typically these often come down to teacher preference for the way they teach, however, there are a variety of ‘dislikes’ for this research-proven methodology. The more commonly cited reasons are given below.

There is a Perception that DI is Only Suitable for Some Children

Fritzer and Herbst (1999) are one of many to raise the question as to why DI would be used school wide, and not restricted to students at risk due to poverty or special education status (p. 46). Similarly, Demant and Yates (2003) surveyed teachers and found that the majority believe DI is not suitable for all students (p. 488). This argument possibly hails from DI’s early applications, when it was implemented as a means to improve educational outcomes for students from impoverished backgrounds. It has since been repeatedly demonstrated that DI is similarly successful with children from all classes, including those from the inner city as well as those in rural and remote regions; students with mild disabilities right through to above average students, as well as students in early grades right through to high school (Adams & Engelmann, 1995, p. 97; Bessellieu et al., 2001, p. 14; Gersten et al., 1986, p. 18; Kim & Axelrod, 2005, p. 115; Lockery & Maggs, 1982, p. 263; Snider &

Schumitsch, 2006, p. 18; Tarver, 1998, p. 20). Furthermore, it can be used with a whole class or in a withdrawal setting with small groups or even one-on-one (Lockery & Maggs, 1982, p. 286). Quite simply, research documents the success of DI for students of any description, regardless of their assigned label or even supposed learning style (Bessellieu et al., 2001, p. 17; Tarver, 1998, p. 20). Learning styles assume that students learn best when taught under certain conditions that may be specific to the individual, for example through movement activities or increased visual stimulus. Because DI places high emphasis on breaking down the task to make it easier to teach and learn, it actually bypasses the need to progress through these various ‘channels’ by teaching it directly and explicitly (Hempenstall, 2013, ‘Evaluation’, para. 3; Tarver, 1998, p. 20). Similarly, it is suitable for students who are intrinsically motivated, as well as those relying on external motivation for success in the classroom (McFaul, 1983, p. 68).

One of the ways DI is able to cater to the individual learning needs of students is through individual placement in the program. As discussed previously, placement tests dictate where students commence instruction, rather than relying on labels, learning styles or other within-student factors (Lockery & Maggs, 1982, p. 286; Vitale & Kaniuka, 2009, p. 30). It is important to reiterate Engelmann’s (1980) premise of DI, whereby student failure is an indication of teaching failure. It is not the result of some factor from within the child, it is because the task has not been taught sufficiently for the student to master it (p. 290). Using the same reasoning, Engelmann advocates that all students can learn when taught effectively: it is not about ‘who’ the learner is, but rather how well they are taught.

A Belief that DI is just Rote Learning and Only Suitable for Learning Basic Skills

This is a common interpretation of DI, concluding that students mindlessly repeat and recite information without actively learning and synthesising it (Bessellieu et al., 2001, p. 14; Fritzer & Herbst, 1999, p. 45; Kim & Axelrod, 2005, p. 115; Vitale & Kaniuka, 2009, p. 30). However, it has been demonstrated that DI can be successfully used to teach both basic skills as well as higher order skills (Adams & Engelmann, 1995, p. 97). For example, children taught to read using DI synthetic phonics programs have simultaneously demonstrated impressive gains in comprehension measures, suggesting that they are not merely ‘barking at print’ as some may claim (Meyer, 1984, p. 392). White (1988) similarly found high effect sizes for comprehension, and argued that there was little statistical difference between effect sizes for decoding and comprehension when taught using DI (p. 369). Importantly, Bessellieu et al. (2001) found that skills taught using DI methods generalised to other contexts and applications (p. 16) supporting the notion that the skills taught in DI programs are generative in nature – that is, they focus on learning strategies to a high degree of fluency so that students may apply these strategies beyond the DI lesson and content.

Lockery and Maggs (1982) acknowledged that the majority of DI programs tend to focus largely on essential skills to ensure students are well equipped to access the curriculum at all levels (p. 287). This is also supported by Hattie (2009) and Hempenstall (2013) who noted that instruction resulting in automaticity of lower order skills will enable learners to more effectively utilise cognitive processing for complex tasks (p. 240). The repetition that is so frequently criticised in DI is one of the key reasons why skills are learned to mastery and subsequently maintained (Vitale & Kaniuka, 2009, p. 30). Adams and Engelmann (1995) stress that this attention to essential skills is necessary to build up the component abilities required for broader and higher order tasks (p. 26).

DI is Too Teacher Directed and Encourages Students to be Passive

This criticism largely comes from those who subscribe to an inquiry-based learning philosophy (Bessellieu et al., 2001, p. 14; Snider & Schumitsch, 2006, p. 18). Proponents of inquiry-based learning claim that the balance of power in a DI program is tipped firmly in favour of the teacher, resulting in a lack of student involvement and engagement (Ewing, 2011, p. 84; Vitale & Kaniuka, 2009, p. 30). As discussed previously, DI is designed to elicit a high number of student responses, which ultimately results in far more active involvement on the part of the student.

There is strong resistance from some who claim that DI treats students as passive participants in learning, expecting them to be robotic and reflexive rather than active in creating their own understanding (Snider & Schumitsch, 2006, p. 18). This perception of students being passive in a DI lesson has also led to the suggestion that students are prevented from developing a positive self-concept because they do not have 'ownership' of their learning (McFaul, 1983, p. 68). However, empirical data demonstrate that these affective domains are more positively impacted with DI than with other, more child-led models whose sole purpose is to increase self-esteem (Adams & Engelmann, 1995, p. 97). Baumann (1988, p. 716) and Tarver (1998, p. 21) argue that DI is designed to gradually reduce the amount of teacher directedness in lessons, supporting students to take on increasing independence in applying their newly learned skills. It is the very nature of faultless instruction to arrange teaching so that it is easy for the learner to learn (Engelmann, 1980, p. 35). It prevents students from practising errors or developing inaccurate, compensatory strategies that learners otherwise may rely on (Adams & Engelmann, 1995, p. 14).

Teachers Feel that DI Does not Allow Them to be Creative

Many teachers reject DI because they feel they cannot teach in the way they prefer, claiming that the teacher script removes any scope for creativity in the classroom (Bessellieu et al., 2001, p. 14; Lee et al., 2007, p. 30; Snider & Schumitsch, 2006, p. 25). Using DI in core subjects such as English and Mathematics does not mean that the entire school day needs to follow the structures of DI. There is still plenty of scope in the curriculum for teachers to flex their creative muscles, while being balanced by more structured and explicit instruction to meet the needs of their students in core learning areas. Snider and Schumitsch (2006) investigated the attitudes of teachers in DI schools (those schools where DI is implemented across all classes) and found that teachers using DI did not feel their creativity had been stifled (pp. 25–26). Bessellieu et al. (2001) similarly reported positive feedback from teachers after using DI, with reports that the program improved their skills as an educator (p. 16) and planning time was greatly reduced as a result of using a DI program (p. 17). Other teachers found that the structure provided by a DI program was useful for defining what was being taught (Lee et al., 2007, p. 30; Reeves, 2010, p. 247) implying that with DI taking the guesswork out of instructional design, educators are more able to focus on other aspects of instruction.

It has to be asked whether it is ultimately in the students' best interests whether the teacher's need for creativity in lessons outweighs the potential benefits (and costs) of choosing or rejecting an instructional methodology on this basis. Perhaps it can be best described with an analogy: Actors, who are renowned for creativity, will typically follow a script but are still able to inject their own flair and personality into a performance. The same can be said of a DI teacher: the script is there to structure the content and outcomes of the lesson; however, the individual teacher can add his/her own dimension to its delivery.

DI Relegates Teachers to ‘Technicians’ Rather than Professionals

Similar to the criticism earlier, some teachers felt that their value as a professional was diminished, viewing the scripted program as a non-negotiable way to deliver the curriculum without any expertise necessary (Eisenbach, 2012, p. 154; Ewing, 2011, p. 84; Lee et al., 2007, p. 31; MacGillivray, Ardell, Curwen, & Palma, 2004, p. 137; Reeves, 2010, p. 241). There is even a suggestion that DI is better suited to less-experienced teachers who perhaps need more guidance and support than their more experienced counterparts (Eisenbach, 2012, p. 155; Reeves, 2010, p. 254). This could not be further from the truth, with studies demonstrating that the success of DI in classrooms was largely influenced by the experience of the teacher delivering it (Baumann, 1988, p. 715; Commeyras, 2007, p. 406; Gersten et al., 1986, p. 23; White, 1988, p. 371). The more proficient and well versed the teacher is in a given area, the more effective he/she is at responding to individual rates of progress within the group, being able to adjust instruction throughout the lesson in response to the progress of both individuals and the group as a whole (Baumann, 1988, p. 715; Gersten et al., 1986, p. 23; Lee et al., 2007, p. 31; Vitale & Kaniuka, 2009, p. 30). DI is only part of the solution; quality educators can enhance the results. Decisions about grouping and progress monitoring are still the responsibility of the teacher and these rely on teacher expertise. The teachers in Reeves (2010) study ended up treating the script like something of a mentor, looking to it for guidance in their instruction, suggesting that the structure of a scripted program is comforting rather than constrictive to some teachers (p. 247). Teachers also feel they now have a means of assisting their low-performing students, without resorting to more labour-intensive one-on-one interventions (Lockery & Maggs, 1982, p. 286).

Students do not Like DI Lessons

Claims that students find DI boring, repetitive and demoralising would appear to be made on behalf of students, rather than coming from students themselves. As discussed previously, studies have shown that DI outperforms other instructional technologies with respect to improving student self-esteem, confidence and general positive attitudes towards learning (Tarver, 1998, p. 19). Improvement in student attention and behaviour as well as comments about student excitement for learning has been reported (Bessellieu et al., 2001, p. 15) with children thriving in the encouraging environment created by the use of positive reinforcement and noticeable progress (Lockery & Maggs, 1982, p. 286). Reeves (2010) also reported that students were motivated as a result of the progress they were making (p. 251).

Further to this, some claim teachers are simply manipulating their students into ‘performing’ rather than learning (Fritzer & Herbst, 1999, p. 45). There is even suggestion that DI is a government plan to indoctrinate and oppress the population by taking away their ability to think for themselves (MacGillivray et al., 2004, p. 134). Claims that students are taught not to think for themselves because they are so ‘brainwashed’ into responding only to the teacher’s cue imply an authoritarian intention to using DI. Such suggestions go against the very essence of the DI model whereby the instructional sequence is deliberately and gradually arranged towards more independent learning as students master the necessary skills (Gersten et al., 1986, p.19; Kim & Axelrod, 2005, p. 114; Tarver, 1998, p. 21).

DI is not the Best Way to Teach, There are More Effective Ways

While not a common criticism, one of the more surprising arguments for not using DI is that there are more effective ways to teach (Adams & Engelmann, 1995, p. 31). This is a

somewhat startling claim considering, as discussed in the ‘Students do not like DI lessons’ section, that the more popular choices of constructivism and discovery learning have both been largely discredited in empirical studies (Alfieri, Brooks, Aldrich, & Tenenbaum, 2011, p. 2). Research that is referenced in support of alternative methods such as discovery learning and constructivism appears to be low quality at best and, more typically, descriptive and anecdotal (Carter & Wheldall, 2008, p. 18; Kim & Axelrod, 2005, p. 115). The results of large-scale comparison studies such as Project Follow Through and the more recent meta-analyses detailed previously provide convincing empirical evidence of the efficacy of DI.

Most common among those that oppose DI are educators subscribing to a constructivist or discovery learning philosophy. These philosophies take the approach that learning occurs best when it is self-constructed, initiated by students themselves in response to their interests with the teacher acting as a facilitator or guide (Heal, Hanley, & Layer, 2009, p. 123). It operates under the premise that students are capable of learning without explicit instruction or extrinsic controls (Alfieri et al., 2011, p. 1). What is apparent is that discovery learning is not a set of teaching strategies, but a philosophy to subscribe to. It does not describe what a lesson looks like, but rather the beliefs that influence the underlying instructional design (or deliberate lack of it). By its very nature, constructivism is difficult to define as it can be presented in many different ways dependent on the context. In short, there are stark differences between DI and discovery approaches. In their meta-analysis of over 80 studies comparing discovery learning with other forms of instruction, Alfieri et al. (2011) found discovery learning to be less effective than more explicit models of instruction (p. 12). Furthermore, studies that were found to be of higher quality showed even larger benefits for explicit instruction over discovery, alluding to the dubious quality of research conducted to support discovery approaches. Similar to results previously discussed, more affective domains such as social skills showed the strongest gains in the explicit instruction condition (p. 11).

What is especially interesting when reviewing criticisms of DI is that the very elements that seem to be disliked the most are those that are key to its efficacy, such as a highly prescriptive instructional sequence and teacher-led instruction. Moreover, many of these have been identified as qualities used by effective teachers. For example, the use of a structured sequence to strengthen connections between concepts; academic focus; high expectations for all students to master learning; explicit instructions; ongoing progress monitoring; adjusting instruction in response to student mastery as needed; and a positive environment are all recognised as practices of effective teachers (Stronge, Ward, & Grant, 2011, p. 341). Perhaps most importantly, effective teachers view student success (and likewise, failure) as the responsibility of the teacher. With such consensus already in place, there seems little value in repeating research to determine instructional efficacy. Future efforts should be focused on following through on what has repeatedly been found to be effective.

Moving Forward

Based on the objections that continue to plague DI, it appears that it will take more than just strong empirical evidence to encourage the education community to embrace it. Research into the efficacy of various DI programs continues to abound, so the power of DI as an instructional technology is not in question. It appears that what DI boasts in effectiveness, it lacks in social appeal. Drawing from the criticisms discussed in the ‘DI is not the best way to teach, there are more effective ways’ section, it would seem that some

of this lack of appeal could be attributed to misinformation or a limited knowledge of DI and its components (Gersten et al., 1986, p. 29). If this indeed is the case, would building a more reliable knowledge base of what DI is (and importantly, what it is not) result in a more favourable assessment and, if so, how would this be done?

One possible solution to circumvent any potential misunderstandings or lack of knowledge regarding DI would be to provide pre-service teachers with training and accurate information before they enter the profession. By capturing teachers prior to commencing their teaching careers, there will be, logically, more teachers in the profession who have been equipped with an understanding of a methodology that boasts a solid and enduring evidence base. The National Inquiry into the Teaching of Literacy (DEST, 2005) was scathing in their review of pre-service teacher education, noting that most institutions were heavily biased towards constructivist approaches and direct teaching was either heavily criticised or dismissed in their programs (p. 30). Similarly, Commeyras (2007) reported that DI was not considered necessary to include in pre-service teacher training, asking, 'What would we do? Sit around and practise reading scripted lessons?' (p. 405). Commeyras (2007) goes on to conclude that she sees little value in necessarily preparing pre-service teachers for DI as 'what holds currency today may be gone in a year or two or three' (p. 407). Comments such as these appear to overlook the long span of research in support of DI. DEST (2005) also noted an apparent lack of educators referring to research when selecting effective instruction for classroom teaching and interventions (p. 9). Without making mention of a specific program, the report made several recommendations regarding addressing literacy achievement in schools that are consistent with the underlying premise of DI. These include: the assumption that all children can learn, making instruction explicit, and adopting a whole school approach combined with professional development to ensure that teachers are educated and supported in implementing effective programs (p. 9).

For practising teachers, studies have found that when they are introduced to DI with appropriate professional development and then provided with ongoing support and feedback, they are more accepting of DI (Gersten et al., 1986, p. 29; Kim & Axelrod, 2005, p. 117). In fact, the more time spent using the program within this supportive model, the more favourable the opinion of DI becomes (Proctor, 1989, p. 41). Gersten et al. (1986) went further and investigated more specific ways to effectively train teachers to use DI that resulted in improved positive attitudes. Interestingly, they found that principles of DI were the best for teaching DI. That is, using task analysis to systematically break down the components of DI; ensuring materials are at a suitable level of difficulty for the teacher(s) you are training; conducting frequent observations with corrective feedback during initial acquisition of skills; positive reinforcement; ongoing monitoring and, where required, modelled demonstrations (p. 24). This idea of using direct instruction to teach DI would appear to have support from the teachers surveyed in Blakely (2001). The surveyed teachers were asked to identify their preferred model of support when adopting new teaching skills and methods. Sixty-one per cent of teachers in the study selected an interactive model of support, similar to that described in Gersten et al. (1986) earlier, whereby the coach and teacher engage in a team-teaching arrangement so that the coach could provide immediate corrections and, if necessary, model the procedure (p. 79). When asked to explain why they preferred that model, the teachers surveyed overwhelmingly made reference to the 'hands on' nature of learning the program and receiving immediate feedback (p. 79). The teachers in Gersten et al. (1986) similarly reported positive attitudes towards receiving feedback and a focus on positive reinforcement as well as learning the program through a series of small steps (p. 25). They did report finding the process

awkward initially; however, they came to like it after engaging with the model over time (p. 24). Blakely (2001) posits that this is possibly attributed to teachers not typically being observed in the classroom (p. 73) and therefore taking time to become accustomed to it.

From the research currently available regarding teacher attitudes and acceptance of DI, it would appear that maintaining pressure is necessary to 'chip away' at the walls of resistance in place (Carnine, 2000, p. 9; Guskey, 2002, p. 388). Remarkably, it would appear that the education community's lack of acceptance is not unique to DI. Teachers are not known for readily adopting changes, even in response to significant evidence (Carnine, 2000, p. 2; Lindsley, 1992, p. 21; Snider & Schumitsch, 2006, p. 17). Carter and Wheldall (2008) contend that while small aspects of change may occur, we are unlikely to see major change happen in a short period of time: it will require a more measured phase of correction, with these smaller changes accumulating over time (p. 8). Perhaps the units of change required to adopt evidence-based practices such as DI would be more manageable if there was a closer match up between their underlying principles and the philosophical values of teachers. This is difficult, however, because as most teachers do not specifically subscribe to a set of beliefs about education, they more typically make decisions in an eclectic manner, based on intuition or personal preference (Carnine, 2000, p. 8; Carter & Wheldall, 2008, p. 9; Hempenstall, 2006, p. 85; Snider & Schumitsch, 2006, pp. 17, 22). With this in mind, there is little value in continuing to present empirical data because it is likely teachers will continue to select and implement teaching practices based on personal beliefs and preferences rather than making large changes in response to empirical data (Kim & Axelrod, 2005, p. 112).

According to Guskey's (2002) model of teacher change, a change in teacher attitudes and practices will not occur as the result of professional development or statistical evidence alone, but rather once they have witnessed or experienced the success of the program or methodology first hand (p. 383). Furthermore, if the change in teacher practices results in continued success, there is a greater likelihood these changes will become permanent (p. 384). Guskey (2002) goes on to say that new techniques and procedures take time to master, which ultimately adds to a teacher's workload. If teachers are to commit to new learning and making changes to their current practises, they need reassurance that their students will benefit, and even more importantly, that it will be more effective than what they are currently doing (p. 386). With this in mind, it appears that significant support and follow up will be needed to diminish resistance to DI. From what we know of teacher attitudes to change in general, we cannot simply present data on the efficacy of DI. Instead, we need to create an environment in which DI is almost a natural conclusion as a result of pre-service teacher training, professional training and coaching in addition to policy and community support.

In summary, negative attitudes towards DI would sometimes appear to be the result a mismatch of teaching philosophies and in some cases can be attributed to misinformation about the methodology. In order to improve attitudes towards DI, research suggests a combination of three main practices: first, widespread education about DI to ensure that accurate information is disseminated. This includes pre-service teacher education and professional development of practising teachers. Second, schools and staff implementing (or considering whether to implement) DI receive active, ongoing support to learn the skills, as well as develop the confidence required in the new methodology. Finally, teachers and schools need hard data to demonstrate the effects that their newly implemented methodology has resulted in. The combination of these three aspects provides a rationale (the why); a procedure (the what and how) and an evaluation (results).

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