Hammill Institute on Disabilities

Intervention in School and Clinic XX(X) 1–8

DOI: 10.1177/1053451211414192
http://isc.sagepub.com hosted at http://online.sagepub.com
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# Evidence-Based Instruction Is Not Enough: Strategies for Increasing Instructional Efficiency

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## Abstract

Even evidence-based instructional methods may not be sufficient for closing achievement gaps. If teachers are not maximizing instructional time, achievement gaps are likely to widen over time; therefore, instruction need not only be effective but efficient as well. The purposes of this article are to (a) provide practitioners with a broad definition of instructional efficiency and (b) describe several considerations for increasing efficiency in the classroom. Suggestions are made for planning, delivering, and evaluating instruction.

## Keywords

academic instruction, instructional efficiency

Few would argue that there are significant achievement gaps between various groups of students in today's schools. For instance, recent results from the National Assessment of Educational Progress indicate that White and Asian/Pacific Islander students outperformed Black, Hispanic, and American Indian/Alaska Native students in reading (Rampey, Dion, & Donahue, 2009), writing (Planty et al., 2008), and math (Planty et al., 2009). Students whose parents attained higher levels of education also performed better in reading (Planty et al., 2009), writing (Planty et al., 2008), and math (Planty et al., 2009) than those whose parents had less

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formal schooling. Similar gaps exist between students from higher SES backgrounds and those from low SES backgrounds (Planty et al., 2008, 2009) and those who attend school in suburban areas versus urban or rural areas (Planty et al., 2008, 2009). These gaps may be even more pronounced for students with disabilities, including those with emotional/behavioral disorders (Reid, Gonzalez, Nordness, Trout, & Epstein, 2004) and those with learning disabilities (Newman, 2006), who as a group are consistently outperformed by their peers without disabilities on academic measures.

The cumulative effects of these achievement gaps may lead to poorer postschool outcomes for youth with disabilities when compared to their peers without disabilities. Indeed, 4 years after leaving high school, youth with disabilities were less likely to be enrolled in postsecondary programs, less likely to be employed, and less likely to have a checking account than were their same-age peers in the general population (Newman, Wagner, Cameto, & Knokey, 2009). In the United States, there is a societal belief that there is equal opportunity and access to "the American dream" for all children. However, the academic achievement statistics reveal otherwise. Some students are at a significant disadvantage based on race, class, and/or disability, and thus there is a need for dissemination of instructional strategies that help children who are behind catch up (i.e., efficient teaching strategies). Efficiency should be a paramount concern of special educators, as their students, by definition, are struggling to reach grade-level expectations.

The reality is that there is only so much time in a school day allocated for academic instruction. Even evidence-based instructional methods may not be sufficient for closing the achievement gaps if the procedures cannot be reasonably implemented within an allocated classroom time frame. In other words, there are scientifically supported instructional strategies that work but are not efficient enough to allow students with disabilities to catch up with their peers. If teachers are not maximizing instructional time, achievement gaps are likely to widen over time; therefore, instruction need not only be effective but efficient as well. This article (a) provides practitioners with a broad definition of instructional efficiency and (b) describes several considerations for increasing efficiency in the classroom.

## What Is Instructional Efficiency?

Simply stated, instructional efficiency is teaching and managing a classroom in a way that yields desired outcomes while using no more time, effort, or resources than necessary. Perhaps the most common definition of instructional efficiency has to do with learning rate, or how much a student learns in a given amount of time (Skinner, Belfiore, & Watson, 1995). When teachers implement methods that help students with disabilities learn quickly, those students can learn more material and begin to catch up with their peers (Skinner, 2010). When comparing instructional strategies, if there are two strategies that yield the same result (i.e., they are equally effective), the one that takes less time to implement is the preferred strategy because it is more efficient. Although this may be the most common, and perhaps most important, definition of *efficiency*, teachers must also consider effort and other resources (e.g., human and fiscal resources) when making instructional decisions. Again, if two strategies yield the same result (and are equally efficient in terms of learning rate), the one that requires less effort or is less expensive to implement is the preferred option.

## Considerations for Increasing Instructional Efficiency

To be most efficient, educators must take into consideration several factors when planning, delivering, and evaluating their instruction.

### *Planning for Instruction*

The decisions that teachers make before their students arrive each morning are critical to their success; these decisions set the tone for the school year. In planning for instruction, teachers must get organized, set the stage for learning, and make strategic decisions about what to teach.

*Getting organized*. An efficient, well-run classroom begins with an organized teacher who considers arrangement of classroom space and materials, determines predictable routines and procedures, and decides how to use instructional time efficiently (Marzano, 2003). These considerations establish a framework for how the classroom will operate, and although this framework should be reevaluated and adjusted as the year progresses, the importance of its presence in the beginning cannot be overstated.

When teachers organize the physical space, they should (a) arrange student workspace to promote flexible grouping and differentiated instruction by allowing for whole-group, small-group, and one-on-one instruction; (b) create purposeful traffic patterns that support routines, discourage congestion, and allow for easy access to strategically placed materials; and (c) develop clear, consistent systems for managing administrative tasks (e.g., filing, collecting data).

With a well-organized physical environment, teachers can focus on an even more important environmental consideration: How will students interact with this environment? In other words, what rules, routines, and procedures will be in place to increase opportunities for learning? For example, how are students expected to enter the room each day, including where they should put their belongings, where they should sit, and what they should begin working on? Having clear answers to such questions will help teachers communicate expectations to students, which, in turn, will improve classroom management and efficiency. Thus, it is important that teachers are clear about how the classroom will look and operate before students arrive.

In addition to considering how students will interact with the physical environment, teachers face many decisions about how to manage time (Marzano, 2003). One of the first is a classroom schedule, which needs to be well thought out and aligned with instruction. Teachers should determine instructional priorities (e.g., literacy, math) and set a schedule that allows students to learn these subjects when they are most alert and focused (e.g., morning, before recess) and makes optimal use of support personnel. Teachers can be strategic by placing a less appealing task (e.g., spelling lesson) before a more appealing activity (e.g., recess), so that the more appealing task rewards active engagement in the more difficult one. Additionally, teachers should recognize that longer blocks of time (e.g., literacy block) can and should be broken down into smaller, more manageable chunks of time to keep students' attention and allow for distributed practice (Toppino, Cohen, Davis, & Moors, 2009).

*Setting the stage for learning*. Once teachers have developed rules, routines, procedures, and schedules, they must clearly convey their expectations to students. Even though teachers should determine their classroom rules prior to students arriving, there are also benefits from engaging students in developing classroom systems (DeVries & Zan, 2003). Teachers can still incorporate student participation, and because they have clearly defined their expectations, they will be better prepared to lead students to that end.

It is important to put in time at the beginning of the year explicitly teaching students expectations, modeling with examples and nonexamples, and providing opportunities for practice with feedback. To invest students in following rules, teachers may have students sign contracts to demonstrate commitment and may use group contingencies to promote interdependence. Classroom rules, consequences, and schedules should be visible, clearly communicated, and consistently implemented so students know what to expect throughout the day.

A classroom characterized by structure and predictability is important for increasing efficiency because it allows teachers to focus on instruction rather than behavior management and provides a vehicle for teaching students important life skills, such as organization, time management, and self-monitoring (Downing & Peckham-Hardin, 2001). For example, teachers can explicitly reference the schedule as they make transitions throughout the day and give students advance notice (e.g., 5-minute warning) when they are engaged in independent or small-group work. For nonreaders, teachers can include pictures to illustrate each event in the schedule and provide a more detailed, individualized schedule for students who receive supplemental services. Providing and referencing schedules allow students to develop time management and self-determination, whereas organized environments, routines, and processes allow teachers to focus on providing quality instruction.

*Deciding what to teach*. For each subject, teachers need to identify the most important skills and concepts, or "Big Ideas" (Kame'enui & Simmons, 1999), which are "instructional priorities" (Kame'enui & Simmons, 1999, p. 8) that facilitate broad application of new learning. Konrad and Hessler (2010) identify two types of big ideas: skill-based (e.g., phonemic awareness for reading) and content-based (e.g., problem-solution-effect; Kame'enui & Carnine, 1998). Most teachers are responsible for teaching both skills and content and, thus, will need to identify which skills will have the broadest impact (i.e., skills that can be generalized to new learning) and which content is most critical. Focusing on such big ideas allows students to fully grasp the most important concepts, which facilitates generalization (within and across the curriculum) and maintenance, which in turn promotes instructional efficiency. Teachers should reference their grade-level standards to help them prioritize knowledge and skills.

Next, teachers need to determine what skills and knowledge their students already have. Specifically, for each subject taught, at the start of the school year and before each instructional unit, teachers should administer a pretest that includes a sampling of critical content from the current and previous year's curriculum. Data from pretests allow teachers to pinpoint where to begin instruction, on which skills to focus, and which students may need remediation. At the end of each unit, teachers should administer a posttest before moving on to a new unit. Data from these posttests will help the teacher decide what to do next: (a) move on, (b) move on but build in review and reteaching of selected concepts (an option only if new content is not dependent on mastery of previous content) for some or all students, or (c) do not move on (i.e., the majority of students have not mastered content needed to move on).

When possible, teachers should find ways to teach more than one skill simultaneously. For example, teaching students to self-monitor their academic productivity (e.g., count number of words written during timed writings) will not only help students increase their output (Stotz, Itoi, Konrad, & Alber-Morgan, 2008) but has the added advantage of teaching self-management. Similarly, investing students in setting goals improves their academic skills and teaches them the importance of goal setting and attainment (Konrad, Fowler, Walker, Test, & Wood, 2007).

Teachers must also build on students' learning by planning for generalization so students can apply their learning to new content, settings, and situations. One way to promote generalization is to teach strategies that can be applied to new tasks (e.g., teaching word parts and decoding strategies may assist students when they encounter unknown words in science texts). Generalization also includes practicing skills with real-world applications. Teachers need to consider where, when, and how students will need to use the particular skills being taught and then design activities to give students practice applying them in such contexts. For example, when teaching money concepts, allowing students to maintain and purchase from a class or school store can simulate

**Table 1.** Techniques for Increasing Active Engagement During Group Instruction

| Technique | Overview |
|---|---|
| Choral responding | Rather than having students take individual turns responding to teacher questions, the teacher poses a question, gives the class a signal to respond in unison, and then provides immediate feedback on the students' group response (Heward, 1994). |
| Write-on response cards | The teacher poses a question or problem to the class, gives students time to write a response on a small dry erase board, gives a signal for students to hold up their responses simultaneously, and then provides feedback to the class (Heward, 1994; Randolph, 2007). |
| Preprinted response cards | The teacher poses a question or problem to the class, and students select and hold up a response card from a set of teacher-made cards and hold up that card when the teacher gives the signal (Heward, 1994; Randolph, 2007). |
| Guided notes | During teacher-led instruction/lecture, teachers provide students with guided notes, "teacher-prepared handouts that 'guide' a student through a lecture with standard cues and prepared space in which to write the key facts, concepts, and/or relationships" (Heward, 1994, p. 304; see also Konrad, Joseph, & Eveleigh, 2009; Konrad, Joseph, & Itoi, 2011). |

real-world application, providing authentic experiences for students

## *Delivery of Instruction*

Instructional efficiency is maximized when teachers match instruction with their students' learning needs (McCurdy, Daly, Gortmaker, Bonfiglio, & Persampieri, 2007). The majority of students with learning problems are students who can learn but do so at very slow rates. Thus, learning rate deficits most accurately characterize the majority of students with disabilities (Skinner et al., 1995). Therefore, it is critical that teachers use methods designed to increase learning rate when students are not fluent with material. Several instructional strategies have been identified to increase students' rates of performance (i.e., amount learned per unit of time).

Perhaps one of the most obvious ways to increase learning rate is to increase the number of learning trials presented to students in a given amount of time. A learning trial is composed of a teacher direction, a student response, and instructional feedback (Heward, 1994), and if teachers can increase instructional pacing by fitting in more trials per unit of time, instructional efficiency is increased. One way to increase pacing is to shorten the time between learning trials (i.e., shorten intertrial intervals). Teaching with shorter intertrial intervals (e.g., 0 seconds vs. 5 seconds) has been shown to increase learning rates (Watson & Ray, 1997) and decrease off-task behavior (Tincani, Ernsbarger, Harrison, & Heward, 2005). To shorten intertrial intervals and increase presentation rate, teachers must be prepared to deliver instruction. Such preparation includes investing time in lesson planning; scripting out learning trials (i.e., writing out ahead of time what the teacher will ask the students, students' expected responses, and teacher feedback statements); rehearsing scripts; developing a system for keeping track of where instruction leaves off and picks up, within and between lessons (e.g., sticky notes); and organizing materials.

How students are grouped for instruction can also affect efficiency. Large-group arrangements may be most efficient in many cases, particularly when teaching grade-level content standards that all students must meet. Given that students learn more when they are actively engaged in instructional activities (Ellis, Worthington, & Larkin, 1994), the best way to ensure efficient learning is to provide opportunities for all students to be engaged (which, of course, can be more challenging with large groups of students). Fortunately, many instructional techniques have been found to be highly effective in increasing student engagement during group instruction. These include choral responding, response cards, and guided notes. See Table 1 for an overview of these strategies.

Even with effective whole-class arrangements, there will be some students who need supplemental instruction. Although providing instruction one-to-one (1:1) has been the standard format for teaching students who require additional support (Elbaum, Vaughn, Hughes, Moody, & Schumm, 2000), research indicates that small-group instruction is equally effective (Helf, Cooke, & Flowers, 2009; Klubnik & Ardoin, 2010). Because more students can be taught in less time (than if taught individually), it offers a solution for the lack of resources (e.g., time, staff) in many schools. Small-group instruction has also been associated with increased peer interaction, increased instructional time (Helf et al., 2009), and opportunities to improve generalization of skills (Polloway, Cronin, & Patton, 1986).

Regardless of the teaching arrangement, another effective way to maximize learning time is through explicit instruction, a systematic approach that involves (a) review of previously taught information, (b) clear descriptions of learning goals, (c) presentation of new material with direct teaching

and modeling, and (d) repeated opportunities for practice with feedback (Carnine, Silbert, Kame'enui, Tarver, & Jungjohann, 2006). When designing practice opportunities, teachers can save time by varying how students respond to instruction. Specifically, some types of responses (e.g., oral) take less time than others (e.g., written). So, although it is important to ensure that students respond in ways that give them practice in how they will eventually be assessed, providing practice with various response topographies can increase efficiency (Skinner, Belfiore, Mace, Williams-Wilson, & Johns, 1997). Furthermore, teachers can provide more spontaneous instruction when they find they have a little extra time if they are open to variety in how students respond. For example, while students are waiting in line to go to lunch, they can chant their multiplication facts. Although eventually students will need to write these responses (and thus should also be given practice in written format), having them say them aloud is still good practice and can be done very quickly and spontaneously.

Another consideration for designing practice opportunities is how much previously mastered material should be practiced with new material. This is particularly critical for students with significant cognitive, academic, and behavioral needs as they may respond better to methods that offer more opportunities to practice new material along with frequent review of previously mastered material (Burns & Sterling-Turner, 2010; Simmons et al., 2007). In traditional drill and practice, students are presented with all unknown items and learn them to mastery. In *interspersal* practice methods, known items are interspersed with unknown items at varying ratios, such as 90% known to 10% unknown. Based on traditional efficiency definitions (i.e., items learned per unit of time), traditional drill-and-practice methods have been found to be more efficient than interspersal methods (Nist & Joseph, 2008). However, practitioners must consider a broader definition of efficiency when making instructional decisions. In some cases, interspersal methods were found to promote better maintenance and generalization than traditional drill-and-practice methods (Nist & Joseph, 2008), indicating a different type of efficiency. That is, when students generalize and maintain skills, teachers are saved the instructional time of having to teach skills under novel conditions or having to reteach "forgotten" skills. Furthermore, some students, particularly lower performing ones, responded better to interspersal methods (Burns & Boice, 2009). Thus, practitioners need to consider the students with whom they are working and what type of "efficiency" they are striving for. Our suggestion is to use student data to inform decision making and consider using both traditional drill-and-practice and interspersal methods to ensure efficiency is being maximized on various fronts.

In addition to teacher-led practice opportunities, students should complete appropriate independent practice activities.

| Criteria | Yes | No | Rationale |
|---|---|---|---|
| Assignment is designed to promote practice of already-acquired skills | | | If students are not able to do an assignment independently, they may experience frustration and give up trying altogether. Or worse, students may attempt assignments and make repeated, uncorrected errors that may contribute to developing habitual mistakes that will cost instructional time later to undo. |
| Assignment promotes practice of specific skills being targeted | | | In an effort to make activities fun for students, teachers sometimes inadvertently design assignments that are practice of skills unrelated to those they intended to target (Heward, 2003). For instance, if students can complete a vocabulary crossword puzzle by simply counting the boxes rather than knowing the definitions, those students are practicing counting, not vocabulary. |
| Directions are clear (and for longer assignments include checklists) | | | Clear guidelines lead to efficiency because products are likely to be of higher quality, which can in turn save the teacher from having to reteach the concepts later and/or save the student from having to redo assignments. |
| Assignment promotes involvement from parents or guardians | | | Parent/guardian involvement in homework may have overall positive influences on students' home environments (Sheridan, 2009) and may enhance efficiency of learning skills and content over time and in multiple settings. |

**Figure 1.** Checklist for evaluating independent practice assignments

These assignments should be designed to promote instructional efficiency as well. There are several specific criteria for selecting and designing assignments that should be considered (see Figure 1).

Regardless of practice format, feedback is essential for student learning and should not be thought of as an add-on feature of instruction; rather, it *is* instruction. Feedback is "information provided by an agent (e.g., teacher, peer, book, parent, self, experience) regarding aspects of one's performance or understanding" (Hattie & Timperley, 2007, p. 81) and is "most effective when it is specific, immediate, positive, [and] frequent" (Heward, 2009, p. 156). To make delivery of feedback more efficient, teachers should use "instructive feedback" by adding related supplemental information when they praise correct responses (Werts, Caldwell, & Wolery, 2003). For example, when teaching the word *red*, after a student correctly reads the word, the teacher says, "Right! That word is red. A stop sign is red." Furthermore, although teachers should carefully plan their instruction and build in opportunities for active practice with feedback, they should also be prepared to take advantage of unplanned learning opportunities (i.e., "teachable moments"). Whether feedback is planned or not, teachers need to be careful not to get too far off track. Wording should be direct, clear, concise, and related to learning objectives.

Similarly, teachers should avoid the urge to drag out error correction by trying to guide the student to the answer. Teachers may engage in this type of feedback because they feel it "softens the blow" for a student who has made an incorrect response or because they feel that lengthy explanations will help the student better grasp the concept. In reality, this type of feedback may do just the opposite: put the student "on the spot" longer (calling more attention to the misunderstanding) and/or lead to even more confusion because the explanation is not conspicuous or the student has lost

attention. Instead, teachers should correct errors directly and quickly by stating the correct response or modeling how to do the process and then immediately give the student an opportunity to try it again (Carnine et al., 2006).

### *Evaluating Instruction*

As students are given the opportunity to learn and practice new skills, teachers should continue administering formative assessments to gauge students' progress, evaluate the effectiveness of their instruction, and gather information to make ongoing decisions about instruction during the school year. If students are not making adequate progress, teachers can determine if students need a different type of instruction, an increase in intensity (e.g., more practice), or additional assessments to identify limited prerequisite skills. If students are making adequate progress, these data give the teacher assurance that the teaching strategies he or she is using are having a positive effect. For students who are progressing at a faster rate than expected, these data may encourage teachers to raise expectations (e.g., set higher goals, provide enrichment), thus increasing learning and instructional efficiency.

Another way to evaluate instruction is to use brief experimental analysis (BEA), an efficient data-based decision-making procedure for assessing and helping students who are not responding favorably to classwide instruction (Petursdottir et al., 2009). This analysis permits instructors to quickly test hypotheses for why learning is not occurring and target appropriate interventions that have a high probability of meeting students' needs (Daly, Witt, Martens, & Dool, 1997). Thus, instructors can identify which interventions are most efficient for individual students by testing a hierarchy of instructional strategies requiring least to most adult supervision (Daly et al., 1997). If it is hypothesized, for example, that students are not acquiring skills due to motivation issues, an instructor may verify the problem by testing whether goal setting with incentives is sufficient for helping those students or if other strategies are needed. In this way, educators can effectively and efficiently differentiate instruction for "can't do" students who need academic skills modeled for them from "won't do" students who just need to set goals and receive systematic reinforcement for accomplishing goals (Petursdottir et al., 2009). Conducting BEAs on how well students are responding to instruction also helps educators become efficient in determining if particular components such as modeling, corrective feedback, opportunities to practice, and reinforcers need to be added to or removed from lessons. Furthermore, learning rate measures (amount of learning over time spent in learning experience) and not just accuracy measures should be used to determine which instructional methods are producing the greatest amount of learning per unit of time allocated for instruction (Skinner, 2010). Additionally, an analysis of instructional efficiency should include maintenance and generalization outcome measures (e.g., Burns & Sterling-Turner, 2010; Nist & Joseph, 2008). Evaluation of these outcomes may help teachers differentiate efficient from inefficient methods of instruction.

## Conclusion

Students with disabilities and/or those performing significantly below their peers are especially in need of instruction that is both effective and efficient given the time constraints for delivering instruction in a school day (Simmons et al., 2007). High rates of learning likely occur when efficient methods are implemented (e.g., Poncy, Skinner, & Jaspers, 2007; Skinner, 2010). If students with disabilities increase their learning rates, they are more likely to make progress toward achieving levels comparable to those of their peers without disabilities. Moreover, educators do not have to use the time devoted to recess and other extracurricular activities to help students catch up to their peers if the methods they implement during regular instruction time are efficient in helping students meet desired learning goals (Skinner, 2010).

Although the considerations presented here for planning and delivering efficient instruction are not a panacea, they do provide practitioners with a starting point for examining their current instructional practices. Furthermore, the strategies suggested are straightforward, inexpensive, and effective. Teachers who are striving to address the needs of all students should find that designing their instruction with these considerations in mind will increase their efficiency and will contribute to closing the achievement gaps.

### Declaration of Conflicting Interests

The author(s) declared no conflicts of interest with respect to the authorship and/or publication of this article.

### Funding

The author(s) received no financial support for the research and/or authorship of this article.

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