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35 Years on the Road from Research to Practice: A Review of Studies on Four Content Enhancement Routines for Inclusive Subject-Area Classes, Part I

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This article is the first part of a two-part article focusing on the 35-year journey of a team of researchers as they navigated the research-to-practice road related to the development of the Content Enhancement Routines, instructional routines to be used during inclusive subject-area instruction. Part I tells the story of the first half of that journey and highlights the original validation research studies that were conducted on four Content Enhancement Routines: the Concept Mastery Routine, the Concept Comparison Routine, the Concept Anchoring Routine, and the Question Exploration Routine. Each study utilizes some type of experimental research design to determine the effects of teachers' use of the routine on the test performance of subgroups of secondary students within inclusive classes. The subgroups included students with disabilities and students without disabilities—high achievers, normal achievers, and low achievers. In all of the studies, the students who participated in the instructional routine earned significantly higher test scores than students who participated in a standard lecture/discussion lesson. Additionally, where significant differences were found, the performance of each subgroup of students that participated in the instructional routine was significantly higher than the performance of their paired subgroup that participated in the lecture/discussion lesson.

One of the most daunting and enduring issues facing the education field today is ensuring that research-validated procedures become part of practice in the nation's schools. To accomplish this goal, these procedures must be translated into formats that can actually be used in schools and are taught to teachers in a way that results in changed teacher practice and improved student outcomes (Darling-Hammond et al., 2017; Desimone, 2009; Fisher et al., 2010). In order for this research-to-practice journey to take place, a number of prerequisites are required. First, the research has to identify instructional methods that actually result in improved student outcomes (Slavin, 2020). The research has to be methodologically sound and accepted by the education field. In other words, the research should employ experimental designs that control for the effects of extraneous factors, and it should be carefully conducted. Further, the research has to produce outcomes that the field endorses. Typically, this means not only that the intervention produces statistically significant outcomes with acceptable effect sizes, but also that those outcomes are *socially* significant (Bernardi et al., 2017). For example, to truly have an impact on the quality of students' lives, the intervention has to teach students who cannot read to read, teach students who cannot write to write, or teach students who are failing tests to pass those tests. A four-point gain from an average score of 52% correct to 56% correct is simply not useful if students are still failing. Furthermore, teachers and students have to be satisfied with the intervention (Kirkpatrick & Kirkpatrick, 2016; Wolf, 1978). If teachers do not like to implement the intervention, they will not use it. Likewise, if students complain to teachers about an intervention, teachers will not use it in the future. If research outcomes are statistically and socially significant, and teachers and students are satisfied with the intervention, educators will be more likely to want to learn about the innovation, use it, and keep using it. If these outcomes are not achieved, the innovation is likely to be ignored.

Before any of this validation research takes place, however, the research-to-practice cycle typically begins with an expressed need in the field of education (see Figure 1). In other words, in order for any educators to be interested in the outcomes of research, they have to see a need for the products of that research. Typically, such a need is expressed through personal contacts with classroom teachers and administrators, through the literature, through national initiatives, or through requests for proposals from funding agencies.

Once the need is expressed, researchers can begin work to address that need. They may hold meetings and gather ideas from in-service teachers. They then can move forward seriously with creating ideas for innovative instructional procedures and obtaining feedback from focus groups. Once an idea has received some positive approval, researchers will often look for funding of some sort through state or federal agencies, foundations, or other interested parties. They will

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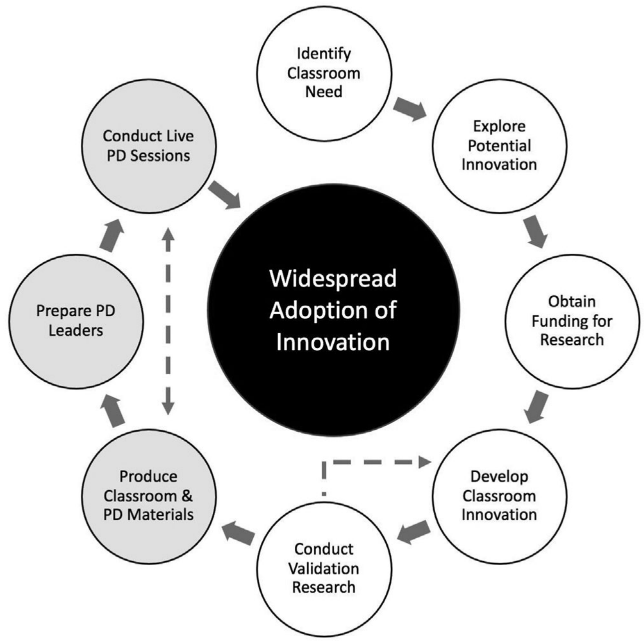

FIGURE 1 Stages of the research-to-practice process.

further refine their innovative idea as they write research proposals. If their proposals match the expressed need in the field, they are likely to be funded. At this point, they will further develop the innovation by creating field test versions of the materials and procedures to be used in their studies. Next, validation research will be conducted. If positive results are not produced, the innovation may need to be refined further, and additional validation research may need to be conducted.

To follow the research-to-practice process a bit further, once successful outcomes have been produced with an intervention through rigorous research, the next step (see Figure 1) in making it available to the education field is to create polished materials that can be used in classrooms (e.g., instructor's manuals, visual aids, student learning sheets, assessments, progress monitoring tools). Additionally, materials will need to be prepared for professional development sessions to educate teachers and administrators about the intervention (State et al., 2019). This process can involve the creation of presentations, practice materials, visual aids, and other materials that can be used in communicating to the field about the intervention. It can also involve creating procedures for working with teachers wanting to learn the new methods. Further, it can involve training leaders in teacher-training institutions, state departments, and school districts to provide professional development. These efforts need to be done with a high level of respect for what the education field demands in terms of professionalism, robustness, rigor, and fidelity (State et al., 2019). In other words, the materials and products related to the research need to be disseminated to the field and to other professionals in a way that determines whether they are acceptable to the field. If not, the materials, products, and training methods will need to be revised to become acceptable. Through a cyclical process, the field can provide feedback to the developers of the materials, and revisions can be made to produce a more successful dissemination effort.

Finally, once the materials, products, and training methods have been found to be acceptable, efforts need to focus on widespread adoption of the research-validated intervention. This stage is probably the most problematic part of the research-to-practice sequence because of the challenges associated with scaling-up efforts (State et al., 2019). One possible challenging factor is that the education field is fragmented; educators in different states, different districts, and different schools like to make their own decisions. Another factor is that, for the most part, individual teachers hold individual authority with regard to choosing what they do and what methods and materials they use in their own classrooms, especially at the secondary level. A further factor is that teacher-training institutions are not likely to teach teachers to use specific methods and procedures; instead, they choose to give teachers a broad background in educational theory and history so that teachers can make good decisions once they begin work in the schools.

Thus, the road from research to practice is certainly challenging. Clearly, conducting well-designed research studies that yield desired outcomes is difficult, especially in today's schools where administrators, who are under pressure to ensure that students meet standards, do not wish to risk student time with unproven methods and materials (Powell & Bodur, 2019). Second, producing professional materials and procedures for successfully instructing teachers in a way that teachers like and that also produces change in their teaching practices in classrooms is something that researchers are typically not trained to do (Cook et al., 2013). Finally, ensuring that the personnel, materials, and procedures are in place for large national scaling-up efforts is very difficult indeed (Slavin, 2020). All of these endeavors require substantial effort, funding, and years of work.

Nevertheless, numerous educators have embarked on the research-to-practice journey, and some have succeeded. One team of developers that has seriously taken on the journey is a team associated with the University of Kansas Center for Research on Learning and Edge Enterprises, Inc. Their journey can serve as one example of a programmatic progression from research to practice. This article chronicles the beginning stages of their journey.

Their story begins in the early 1980s when they had been focusing on the development and validation of instructional methods for secondary students with learning disabilities (LD) who had been placed in resource rooms. The results of their research had yielded the Strategic Instruction Model (Deshler & Schumaker, 1988; Hock et al., 2017) and the *Learning Strategies Curriculum* (e.g., Deshler & Schumaker, 1986). In 1985, spurred on by the national inclusion movement (Carlberg & Kavale, 1980; Gartner & Lipsky, 1987; Stainback & Stainback, 1984), the education field had begun to demand that methods become available for mainstreaming students with disabilities in general education courses. Federal granting agencies quickly made funds available for research in this area through requests for proposals. After applying for these funds, the team received a grant (Deshler & Schumaker, 1984) to develop teaching routines to be used in general education subject-area courses in which diverse classes of students (including low-achieving students) are enrolled. The team was again funded to continue the initial work (Deshler & Schumaker, 1992, 1994; Schumaker & Deshler, 1988, 1988ab, 1990), and later they were funded to develop materials and methods for live professional development (Deshler & Schumaker, 1991, 1993). The resulting line of programmatic research has yielded a new approach for instructing students in inclusive subject-area courses, called the *Content Enhancement Approach* (Hock et al., 2017; Schumaker et al., 1991, 2002; Schumaker & Deshler, 2010), plus materials and methods for providing live professional development to teachers about this new method of instruction.

THE CONTENT ENHANCEMENT APPROACH

The Content Enhancement Approach embodies a way of planning instruction for, and teaching subject-matter content to, diverse groups of students. It involves deciding what information to teach, transforming that information into easy-to-understand formats, and delivering the information in memorable ways. The approach is founded on and incorporates the use of basic learning principles (Lenz et al., 2004). For example, research has shown that students learn more when they are actively involved in the learning process by reading, writing, and speaking during a high percentage of instructional time as opposed to a low percentage of time (Vaughn et al., 2000). They also learn more when abstract concepts are made concrete, when new information is tied to information they already know, when relationships are made explicit, and when important information is distinguished from unimportant information (Swanson & Deshler, 2003).

In addition, the Content Enhancement Approach is based on research that shows that expert learners approach learning tasks by inventing strategies to help them do well on those tasks. Theorists (e.g., Pressley et al., 1987; Pressley & McCormick, 2007) have proposed that the academic performance of struggling learners might be enhanced if they are explicitly and directly taught learning strategies for completing academic tasks. Indeed, research has shown that struggling learners' academic performance can be substantially enhanced if they learn to apply strategies, and the instruction of strategies (called "Strategic Instruction") has been found to be one of the most effective methods for improving their performance (Graham, & Perrin, 2007; Swanson & Hoskyn, 1998; Swanson et al., 1999, Tralli et al., 1996). A "strategy" is a learner's approach to an academic task. It involves performing a series of cognitive and overt behaviors to complete the task (Alley & Deshler, 1979). It is best taught by an expert learner (i.e., an experienced and trained educator) who can demonstrate all the cognitive and overt behaviors involved in completing an academic task. For example, an experienced learner can demonstrate all the behaviors involved in analyzing how two concepts can be compared and contrasted and can then help a student to practice those behaviors.

Thus, the Content Enhancement Approach involves the application of a combination of research-validated learning principles with research-validated Strategic Instruction. Through the Content Enhancement Approach, students are engaged in a learning apprenticeship (Hock et al., 1999; Lenz et al., 2004) whereby their teacher, an expert learner, teaches them how to apply strategies to learn the kind of information that they should learn in a course. In other words, their history teacher teaches them the strategies needed to think about and learn historical information while their math teacher teaches them the strategies needed to think about and learn how to perform mathematical operations. In essence, the major goal associated with this student-centered approach is that the integrity of the information is maintained while the learning of all students is enhanced. The result is that students with disabilities, low-achieving students, normally achieving students, and high achievers learn more when the Content Enhancement Approach is used than when it is not.

As a result of the development work on the Content Enhancement Approach, numerous teaching routines have been created and tested in methodologically rigorous research studies. Each routine focuses on one part of the teaching process. For example, some of the routines focus on organizing information for a course (Lenz et al., 1998), unit (Lenz et al., 1994), or lesson (Lenz et al., 1993) and on communicating that organization to students. Others focus on teaching a major concept(s) associated with a unit of study (e.g., Bulgren et al., 1993, 2000) or comparing and contrasting two concepts (Bulgren et al., 1995). Still others focus on answering a critical course question (Bulgren et al., 2001), organizing key information (Scanlon et al., 2004), teaching key information (Ellis, 1998), introducing new vocabulary (Ellis, 2001), studying key information (Schumaker et al., 1998), deriving key information from textbooks (Deshler et al., 1997), or creating and introducing assignments to students (Rademacher et al., 1998).

Regardless of the purpose of the routine, each routine has three phases that are led by the teacher. First, in the "Cue" Phase, the teacher quickly cues the students that a routine will be used, provides an advance organizer about the information to be covered and the routine to be used and how it will help them, and explains what the students are expected to do. Next, in the "Do" Phase, the teacher and students engage in a discussion in which they work in partnership to coconstruct a visual graphic device. By the end of the lesson, the completed device depicts the information to be learned and the relationships among the information. All students create their own devices during the lesson and can use them to study for tests. They can also be used as outlines for written products. In the "Review" Phase of the routine, the teacher and students review the information that has been covered and discuss how the routine has helped students to learn. Any misunderstandings can be clarified and resolved. Through the use of this three-phase sequence, all of the Content Enhancement Routines are parallel in structure; the students and teacher interact as they work through the three phases and construct a graphic device in partnership that depicts the information being learned.

The line of programmatic research that has focused on empirically validating the Content Enhancement Routines has spanned more than 35 years. During that time, individual studies have focused on individual routines (see Schumaker et al., 2002, and Schumaker & Deshler, 2010, for reviews of the research). Four of the routines, along with the research that has been completed in association with these routines, have been chosen to be the focus of this review article because the work on these routines exemplifies the journey that embodies the whole research-to-practice endeavor covered in both parts of this article. In this part of this article (Part I), each routine will be briefly described, and the research study that has been conducted to empirically validate that routine will be summarized. To complete the stages depicted in Figure 1, the professional development work related to all of the routines will be briefly summarized. Later, in the next part of this article, Part II (see Fisher & Schumaker, 2021, the next article in this issue), the remaining story about the road from research-to-practice related to these same four routines will be recounted.

THE RESEARCH ROAD: INITIAL VALIDATION OF THE ROUTINES

The Concept Mastery Routine

The Routine Itself

The Concept Mastery Routine (Bulgren et al., 1993) was designed for presenting information about a major concept that is foundational to a unit of study. For example, the concept "*tragedy*" might be analyzed during a unit focusing on tragic plays in a literature course. The concept "*colonialism*" might be analyzed in a European history course as the key concept during a unit on westward exploration. The basic idea behind presenting a concept of this kind at the beginning of a unit of study is to provide a foundation upon which the rest of the information in the unit can be built.

Through the use of the Concept Mastery Routine, the teacher and students work in partnership as they analyze various aspects of the major concept and test their understanding of the concept. To do so, the key elements associated with a given concept are explored, including the name of the concept (e.g., "mammal") and the overall concept (e.g., "vertebrate"), and the characteristics that are always (e.g., "has hair," "is warm blooded"), sometimes (e.g., "walks on 2 legs" or "walks on 4 legs"), and never present (e.g., "is cold blooded") in the concept. During this discussion, the teacher models cognitive strategies for determining what kind of characteristic has been named. For example, the teacher might model a self-questioning strategy by saying, "Let's ask ourselves, 'How do mammals get around?'" As the students suggest that mammals walk around, the teacher might ask, "Is this always or just sometimes? Do all mammals walk? Can you think of a mammal that does not walk?" The teacher might then model strategies for finding the answer on the Internet (i.e., Googling key terms, selecting the best option that will answer the question, and scanning for the answer). Once a mammal is named that does not walk but swims, "walks," and "swims" might be listed as characteristics sometimes present in the concept. As the discussion proceeds, the students might be prompted to conduct research themselves on the next issue. Next, examples and nonexamples of the concept are determined, paying close attention to the "always" and "sometimes" characteristics that have been named (e.g., a dog might be listed as a mammal that walks, and a whale might be listed as a mammal that swims). Finally, the teacher models cognitive strategies for testing various possible examples of the concept. For instance, the teacher might posit the duckbill platypus as a possible example of a mammal and show the students how they can use a self-questioning strategy by asking a series of questions about the platypus with each question relating to one "always" characteristic (e.g., "Does the platypus have hair?", "Does it nurse its young?", "Is it warm blooded?", etc.). The teacher can also model strategies for determining the answers through research on the Internet. Then, as each characteristic is researched and checked off, the decision should become clear. Additional possible examples of the concept can then be posited, and the students can be given time to make decisions about classifying them as examples or nonexamples. Throughout this discussion, the teacher and students construct their own versions of a Concept Diagram, a visual device containing all the pertinent information about the concept. (See Figure 2 for an example. See Bulgren et al., 1988, 1993 for other examples.) Throughout the lesson, students are highly involved in the process of analyzing the concept through constant verbal interaction, as well as reading for answers and writing those answers on the diagram. Eventually, by analyzing several concepts in this manner, students learn the cognitive strategies involved in analyzing a concept.

The Original Validation Study for the Concept Mastery Routine

Bulgren et al. (1988) investigated the effects of teacher use of the Concept Mastery Routine on students' test performance in secondary general education classes. Nine science and social studies high-school teachers learned how to use the routine and implemented it for one concept at the beginning of each course unit. Four hundred seventy-five high school students enrolled in the teachers' 9th- through 12th-grade inclusive classes participated in the study. Thirty-two of these students had learning disabilities (LD). A multiple-baseline across-teachers design was used with the teachers; a multiple-baseline across-classes design was employed with the students. Scores on two types of tests were used as student outcome measures: (a) researcher-made tests that focused on the taught concept in each unit and (b) publisher-made tests corresponding to each unit in the textbook. Both types of tests were administered at the end of each unit. One unique aspect of this study relates to the multiple-baseline across-classes design whereby test scores were collected across time. Another unique aspect was the use of the publisher-made tests, a measure of real-world student outcomes that is rarely used in research studies.

Results indicated that the teachers learned to use the routine at mastery levels (80% implementation or above) after 3 hours of instruction. Their students earned significantly higher scores on both publisher-made classroom tests and researcher-constructed concept acquisition tests in science and social studies classes when the teachers began to use the

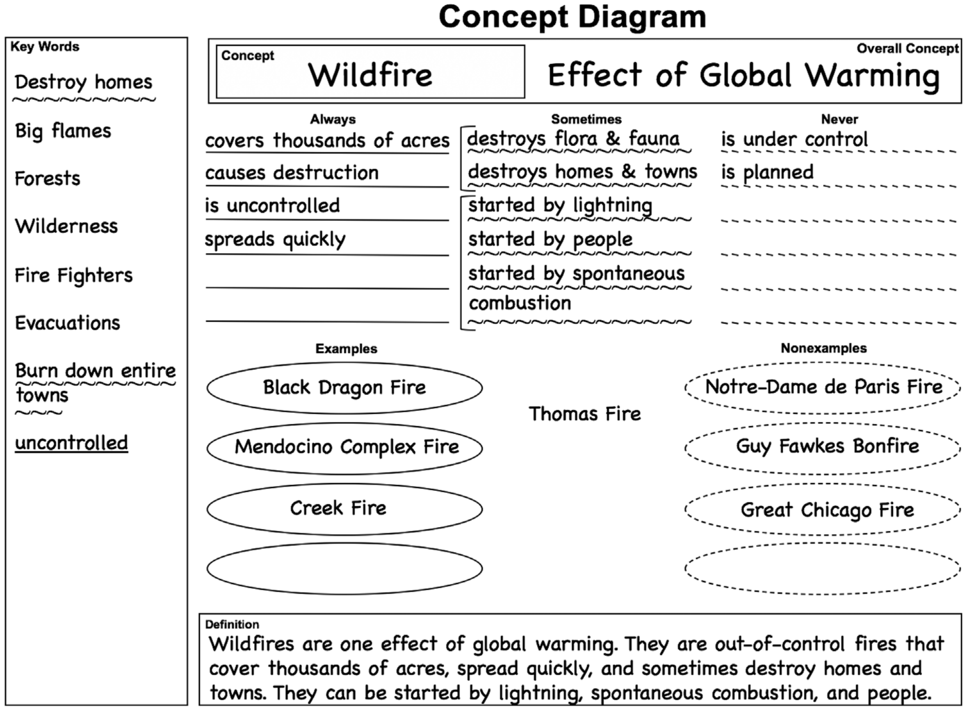

FIGURE 2 Sample concept diagram.
Note: Adapted from "The Concept Mastery Routine: Instructor's Manual," by J. A. Bulgren, J. B. Schumaker, and D. D. Deshler, 1993, Edge Enterprises, Inc. Printed here with permission from the authors.

TABLE 1
Results of the Original Validation Study for the Concept Mastery Routine

			Means		*Within-Group Effects*		
Study, Sample & Design	*Measure*	*Group*	*Pre*	*Post*	*Statistic*	p *Value*	*Effect size*
Bulgren et al. (1988)	Concept acquisition score	St. w/o LD	49%	83%	$t(31) = 8.32$	$p < .0001^*$	***d* = 2.989**[c]
$N = 64$ Secondary students		St. w/ LD	40%	62%	$t(31) = 4.18$	$p < .0001^*$	***d* = 1.502**[c]
$n = 32$ Students w/o LD							
$n = 32$ Students w/ LD	Chapter test score	St. w/o LD	72%	87%	$t(31) = 4.27$	$p < .0001^*$	***d* = 1.534**[c]
MBAGS design		St. w/ LD	60%	71%	$t(30) = 4.73$	$p < .0001^*$	***d* = 1.699**[c]

Note. Bolded effect sizes were calculated after the article was published using calculators provided by Lenhard and Lenhard (2016).
MBAGS = multiple baseline across groups of students; St. = student; LD = learning disabilities.
[a] Reflects small effect size.
[b] Reflects medium effect size.
[c] Reflects large effect size.
* Indicates statistically significant p value.

routine at the beginning of each unit, as opposed to when instruction proceeded as usual in baseline (i.e., when teachers used the lecture/discussion method throughout each unit). Student improvement in scores occurred only after a teacher began to use the routine in the multiple-baseline design. See Table 1 for a summary of the mean scores during baseline and during routine usage for students with and without disabilities. It also shows the results of statistical comparisons between baseline and routine usage scores for each group of students. The differences were statistically significant, and the effect sizes were very large for each group for each type of test. On average, experimental students with LD were scoring 15 points higher on the tests than the control students with LD during the routine usage condition, and their average score was in the passing range (71%). Moreover, 57% of the experimental students with LD and 68% of the experimental non-LD students were passing the regularly scheduled unit tests constructed by the textbook publisher before the intervention, and 75% of the experimental LD students and 97% of the experimental non-LD students were passing these tests after the intervention. Thus, the students were more able to retain unit information after being introduced to a foundational concept through the use of the routine than they were when they received

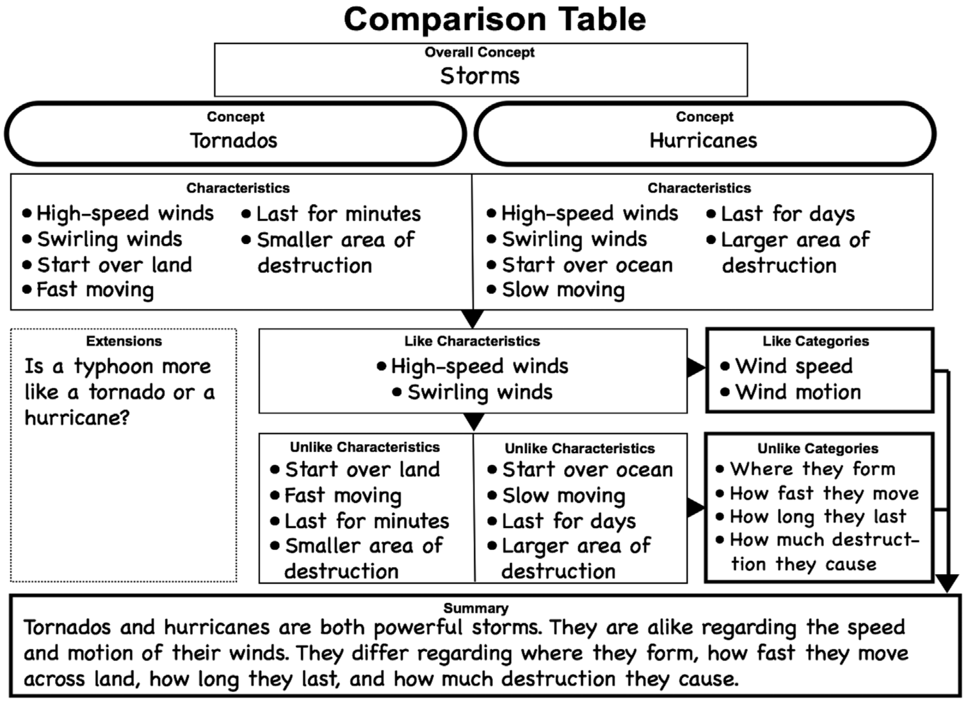

FIGURE 3 Sample comparison table.
Note: Adapted from "*The Concept Comparison Routine: Instructor's Manual,*" by J. A. Bulgren, B. K. Lenz, D. D. Deshler, and J. B. Schumaker, 1995, Edge Enterprises, Inc. Printed here with permission from the authors.

unit information through the lecture/discussion method. The lecture/discussion method was chosen as the instructional method to be used in baseline because it is the most common form of instruction used in general education subject-area courses (Moin et al., 2009).

The Concept Comparison Routine

The Routine Itself

The Concept Comparison Routine (Bulgren et al., 1995) was designed to help students understand the relationships between two new concepts and particularly how the concepts are similar and different. For example, a teacher of a literature course might wish to compare and contrast the concepts "*tragedy*" and "*comedy*." A teacher of a government course might wish to compare and contrast the concepts "*socialism*" and "*communism*." A teacher of a math course might wish to compare and contrast the concepts "*linear equation*" and "*quadratic equation*." To do so, the teacher begins by naming the two new concepts (e.g., "*birds*" and "*mammals*") and the overall concept (e.g., "*vertebrates*"). Next, the teacher and students explore and list the major characteristics associated with each concept (e.g., for "*birds"*: are warm blooded, have a backbone, have feathers; for "*mammals*:" are warm blooded, have a backbone, have fur). From here, the teacher prompts the students to identify which characteristics are shared (e.g., "are warm blooded" and "have a backbone") and not shared ("have feathers" and "have fur") between the two concepts, modeling for the students how to use a self-questioning strategy to pose questions to themselves. Next, the teacher models for the students how to create categories that describe the similar and dissimilar characteristics (e.g., for "warm-blooded" the category is "how body temperature is regulated") and then prompts them to create additional categories. Finally, the teacher and students work together to use a summarizing strategy to create a summary of their understanding of the similarities and differences between the two concepts. The teacher models this strategy, while writing a complete sentence about each comparison and each contrast, and then prompts the students to contribute sentences to the summary. During the discussion, the teacher and students construct a visual device called a "Comparison Table" containing all the pertinent information about the two concepts. (See Figure 3 for an example. See Bulgren et al., 1995, 2002, for other examples.) Thus, through this process, the students learn cognitive strategies for comparing and contrasting two concepts and their characteristics.

The Original Validation Study for the Concept Comparison Routine

Bulgren et al. (2002) investigated the effects of use of the Concept Comparison Routine on secondary student learning of science content, using a randomized control design. The instruction was provided by Bulgren in all the classes. A total of 107 students enrolled in 7th-, 8th-, 10th-, 11th-, and 12th-grade inclusive science classes participated. They were

TABLE 2
Results of the Original Validation Study for the Concept Comparison Routine

Study, Sample, & Design	*Measure*	*Group*	*Means* *Pre*	*Means* *Post*	*Between-Group Effects* *Statistic*	*p Value*	*Effect size*
Bulgren et al. (2002)	Total Score	CG—All St.	–	68.53	$F(3, 97) = 6.91$	$p < .001^*$	$\eta^2 = 0.176^c$
$N = 107$ Secondary students		EG—All St.	–	80.13			
$n = 16$ LA Students		CG—St. w/ LA	–	62.64	$F(3, 12) = 2.55$	$p < .105$	$\eta^2 = 0.389^c$
$n = 33$ NA Students		EG—St. w/ LA	–	86.36			
$n = 21$ HA Students							
$n = 37$ Students w/ LD		CG—St. w/ NA	–	76.02	$F(3, 29) = 2.21$	$p < .107$	$\eta^2 = 0.187^c$
CBPO design		EG—St. w/ NA	–	83.48			
		CG—St. w/ HA	–	84.14			
		EG—St. w/ HA	–	86.93			
		CG—St. w/LD	–	56.68	$F(3, 33) = 3.46$	$p = .027^*$	$\eta^2 = 0.239^c$
		EG—St. w/LD	–	71.32			

CBPO = counterbalanced posttest-only design; CG = control group; EG = experimental group; St. = student; LA = low achieving; NA = normally achieving; HA = high achieving; LD = learning disabilities.
[a] Reflects small effect size.
[b] Reflects medium effect size.
[c] Reflects large effect size.
[*] Indicates statistically significant *p* value.

randomly assigned within their classes to participate in either an experimental group or control group within designated subgroups: high achievers, normal achievers, low achievers, and students with learning disabilities (LD). Fifty-five students were in the experimental group; 52 students were in the control group. A lesson on two diseases, "*malaria*" and "*snail fever*," was taught to the students. The Concept Comparison Routine was used to teach experimental students a lesson on comparing and contrasting the two diseases. Control students were taught the same lesson with the same content using a traditional lecture/discussion method. Both lessons were designed by the researchers to contain the same content. The same test, designed by the researchers and composed of open-ended and objective questions, was given to all students on the next day.

Table 2 shows the mean total test scores for the whole groups of students as well as the low achievers, normal achievers, high achievers, and students with LD. A statistical comparison revealed a significant difference between the test scores of the whole group of experimental students and the whole group of control students. Moreover, a significant difference was found between the test scores of the students with LD in the experimental group and in the control group. Both effect sizes were large. Although a significant difference was not found between the scores of the low achievers in the experimental and control groups, or between the scores of the normal achievers in the experimental and control groups, the effect sizes related to the differences were large. All of the significant differences that were found reflected significantly higher scores for the experimental students as opposed to the control students. No significant difference was found for the high-achiever subgroups even though the mean score for the experimental students was slightly higher than the mean score for the control students. Both groups of high achievers earned relatively high mean scores.

When the students' scores were analyzed to determine whether the students would have "passed" the test, given the typical school standard for a passing grade (i.e., a score of 60% or higher on the test), the percentages of passing students were as follows: Students with LD, 29% in the control group and 71% in the experimental group; low achievers, 50% in the control group and 83% in the experimental group; normal achievers, 88% in the control group and 94% in the experimental group; and high achievers, 100% in the control group and 92% in the experimental group.

The Concept Anchoring Routine

The Routine Itself

Like the Concept Mastery Routine, the Concept Anchoring Routine (Bulgren et al., 1994; Deshler et al., 2001) is a set of procedures that teachers use to plan and lead a discussion with students about a new concept that is foundational to a unit of study. Again, the basic rationale associated with this routine is to provide students with information that can form the foundation upon which new information can be built during the rest of the unit of study. The key to this routine, however, is relating the brand new targeted concept to a concept with which students are already familiar through the use of a complex analogy. For example, the concept "*commensalism*" might be more understandable to students if it is related to the concept of a lemonade stand where a boy and his neighbor form a relationship related to the lemonade stand. In the relationship, the boy places his lemonade stand near the neighbor's home, but the neighbor is neither benefitted nor harmed by the relationship. The boy benefits because there

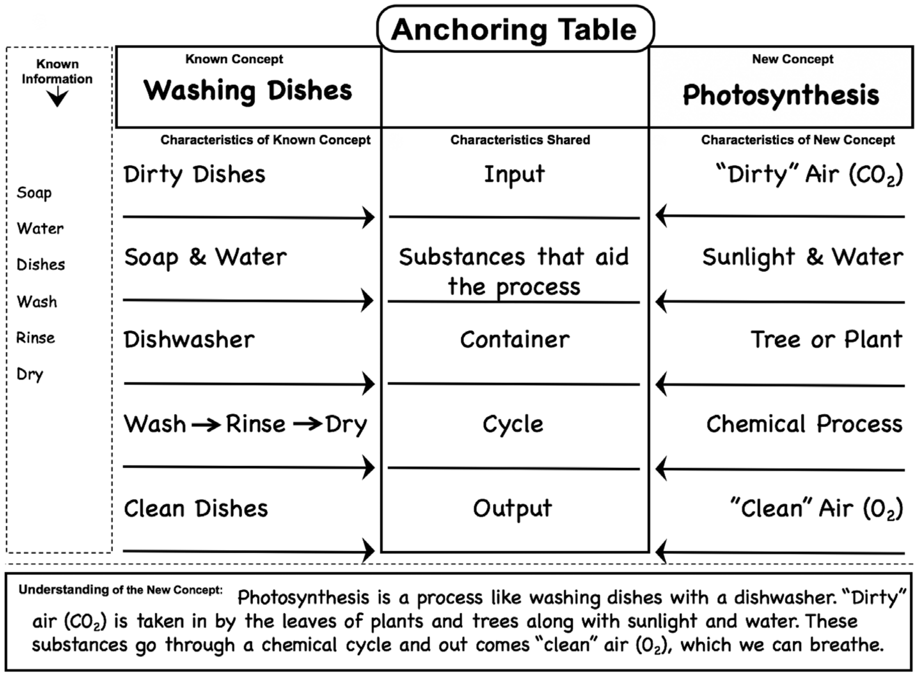

FIGURE 4 Sample anchoring table.
Note: Adapted from "*The Question Exploration Routine: Instructor's Manual,*" by J. A. Bulgren, J. B. Schumaker, and D. D. Deshler, 1994, Edge Enterprises, Inc. Printed here with permission from the authors.

is more foot traffic near the neighbor's home than near his own home. This relationship is similar to many relationships in nature where one party benefits, but the other party neither benefits nor is harmed. The analogy between the story of the lemonade stand and the unknown concept "*commensalism*" helps students understand and remember the unknown concept.

During the use of the Concept Anchoring Routine, then, the teacher and students name the two concepts that are related through analogy (e.g., "The circulatory system" and "The transportation system in a town"). Then the teacher prompts the students to name and list items associated with the known concept "town" (e.g., "roads," "highways," "town center," "trucks," "ambulances"), and then to name or research items associated with the new concept (e.g., "capillaries," "veins and arteries," "the heart," "red blood cells," "white blood cells"). For example, the teacher can model a strategy for looking for information in the textbook or on the Internet that tells the purpose of each part of the new concept. From here, the teacher prompts the students to use a self-questioning strategy to pair up the characteristics of the two concepts (e.g., "What are the capillaries in your body most like in a town?" or "What are the red blood cells in your body most like in a town?"). Next, the teacher will model a strategy for naming the relationship between the parallel characteristics (e.g., for the parallel items "red blood cells" and "trucks," the relationship might be created by asking "What do they both do?", and the answer would be "transport important supplies"). Then the teacher prompts the students to name relationships for the remaining pairs. Finally, once they have listed all the relationships, the teacher models a summarizing strategy to compile their understanding of the new concept by writing a complete sentence about the categories of parallel characteristics. As a result of this process, students learn how to use cognitive strategies to analyze a concept and its similarities to another concept and to summarize the relationships. During the discussion, the teacher and students construct a visual device, called the Anchoring Table, containing all the pertinent information about the new concept and the known concept. (See Figure 4 for an example. See Bulgren et al., 1994, 2000, for other examples.) Each student then has an Anchoring Table to use when studying for the unit test, or when writing about the concept.

The Original Validation Study for the Concept Anchoring Routine

Bulgren et al. (2000) conducted a study to determine the effects of the Concept Anchoring Routine on student learning of secondary subject-area content. A total of 83 seventh-graders participated in the study. They were enrolled in eight inclusive science classes that were randomly assigned to either Condition 1 ($n = 39$) or Condition 2 ($n = 44$). The performance of four subgroups of students within the inclusive classes was monitored: high achievers, normal achievers, low achievers, and students with LD.

Two concepts were chosen as the targets of the instruction: "*commensalism*" and "*pyramid of numbers*." Both concepts were instructed in both conditions; in Condition

TABLE 3
Results of the Original Validation Study for the Concept Anchoring Routine

			Means		*Between-Group Effects*		
Study, Sample, & Design	*Measure*	*Group*	*Pre*	*Post (SD)*	*Statistic*	*p Value*	*Effect size*
Bulgren et al. (2000) $N = 83$ Secondary students	Commensalism: Understanding & Facts Score	CC—All St.	–	52% (24.85)	$F(1, 81) = 20.03$	$p < .0001^{*}$	$\mathbf{d = 0.984}^{c}$
		EC—All St.	–	77% (25.17)			
$n = 15$ LA Students		CC—LA St.	–	46% (27.68)		$p = .03^{*}$	$\mathbf{d = 1.305}^{c}$
$n = 28$ NA Students		EC—LA St.	–	80% (24.03)			
$n = 12$ HA Students $n = 28$ Students w/ LD		CC—NA St.	–	64% (19.52)		$p = .007^{*}$	$\mathbf{d = 1.031}^{c}$
CBPO design		EC—NA St.	–	84% (19.26)			
		CC—HA St.	–	75% (13.69)		$p = .007^{*}$	$\mathbf{d = 1.962}^{c}$
		EC—HA St.	–	96% (6.46)			
		CC—St. w/ LD	–	36% (19.71)		$p = .051$	$\mathbf{d = 0.804}^{c}$
		EC—St. w/ LD	–	55% (25.78)			
	Pyramid of Numbers: Understanding & Facts Score	CC—All St.	–	64% (30.32)	$F(1, 81) = 9.12$	$p = .001^{*}$	$\mathbf{d = 0.664}^{b}$
		EC—All St.	–	80% (19.14)			
		CC—LA St.	–	53% (24.78)		$p = .11$	$\mathbf{d = 0.866}^{c}$
		EC—LA St.	–	73% (20.95)			
		CC—NA St.	–	73% (24.93)		$p = .02^{*}$	$\mathbf{d = 0.849}^{c}$
		EC—NA St.	–	92% (19.52)			
		CC—HA St.	–	100% (0.00)		$p = .14$	$\mathbf{d = 0.8112}^{c}$
		EC—HA St.	–	94% (10.46)			
		CC—St. w/ LD	–	40% (24.89)		$p = .002^{*}$	$\mathbf{d = 1.480}^{c}$
		EC—St. w/ LD	–	69% (15.38)			

Note. Bolded effect sizes were calculated after the article was published using calculators provided by Lenhard and Lenhard (2016).
CBPO = counterbalance posttest only; CC = control condition; EC = experimental condition; St. = student; LA = low achieving; NA = normally achieving; HA = high achieving; LD = disabilities.
[a] Reflects small effect size.
[b] Reflects medium effect size.
[c] Reflects large effect size.
[*] Indicates statistically significant *p* value.

1, however, "*commensalism*" was taught using the Concept Anchoring Routine, while in Condition 2, "*pyramid of numbers*" was taught using the routine. When the routine was used, the concept was called the "enhanced concept"; when the routine was not used (i.e., the lecture method was used instead), the concept was called the "nonenhanced concept." A counterbalanced design was used with one concept being taught using the routine and one concept being taught with the traditional lecture method in one condition and then flip-flopping the concepts and the type of instruction for the other condition. In other words, all of the students received instruction in both concepts. In each condition, they participated in the routine for one concept and in a lecture for the other one. Thus, the groups assigned to the two conditions served as controls for each other. Bulgren, who was the researcher and is a certified teacher, provided the instruction for all of the classes in both conditions.

A 32-item researcher-created multiple-choice test served as the outcome measure. Items on the test related to information associated with four concepts: "*commensalism*" and "*pyramid of numbers*," plus two other concepts that were never paired with the routine. Information about these two nonenhanced concepts was delivered with the lecture method. A student's score was the percentage of items answered correctly related to each concept.

Table 3 displays the results of the Bulgren et al. (2000) study, including the mean test scores for the whole groups of students and for the subgroups of students. Also shown are the between-group effects between the scores of experimental and control students. All of the subgroups earned significantly higher scores on the test items when the routine was paired with the concept than when traditional lecture instruction was paired with the concept, with one exception: High achievers did not earn higher scores when they participated in the routine for "*pyramid of numbers*." The reason for this result was that high achievers earned an average score of 100% on the test items associated with that concept when they received the lecture-based instruction. In all other instances, all the subgroups of students earned significantly higher scores when the content was paired with the routine than when it was not. For example, when students with LD participated in the routine, they earned an average test score of 69% on "*pyramid of numbers*" items and 55% on "*commensalism*" items. When they did not participate in the routine, they earned an average test score of 36% on "*pyramid of numbers*" items and an average test score of 40% on "*commensalism*" items. For the student groups as a whole, and for the subgroups, students earned significantly higher scores on the test items when they participated in the routine than when they did not. All of the effect sizes for the between-condition differences were large, except for the effect size for the difference between the whole groups of students on the "pyramid of numbers" test items; in this case, the effect size was medium.

With regard to the percentages of students who earned passing scores on the tests, the results are as follows. Seventy-seven percent of the students with LD passed in the enhanced condition, and 27% passed in the nonenhanced condition. Eighty-six percent of the low achievers passed in the enhanced condition, and 50% passed in the nonenhanced condition. Ninety-three percent of the normal achievers passed in the enhanced condition, and 71% passed in the nonenhanced condition. All of the high achievers passed in both conditions.

The Question Exploration Routine

The Routine Itself

The Question Exploration Routine (Bulgren et al., 2001) was designed for teaching students information related to a critical question at the heart of a unit of study. For example, a critical question related to the U.S. Civil War in a U.S. history course might be "Why did the Southerners want to fight in the Civil War?" Another one might be, "How did geography play a role in the U.S. Civil War?" A critical question related to Shakespeare's play *Romeo and Juliet* might be "Why did Shakespeare use events that can be explained either as 'chance' or 'fate' in *Romeo and Juliet*?" To proceed through the routine, the teacher begins by specifying the critical question. Next, the teacher engages the students in a discussion of the words in the question and what they mean. During this discussion, the teacher models the cognitive strategies involved in looking for, finding, and analyzing a word's definition and then using a paraphrasing strategy to succinctly define that word within the context of the critical question. Then, the teacher and students create and answer supporting questions that must be addressed before the critical question can be answered. The teacher models a strategy to create a question that must be answered before the critical question can even be considered. For example, the teacher asks herself, "What do I need to know before I can even think about this critical question?" Then the teacher answers that question by stating, "I need to know the geography of the United States during this time." Then the teacher models writing a subquestion like, "What was the geography of the United States at the time of the Civil War?" Next, the teacher models a research strategy for finding information related to the geography of the United States. The teacher then prompts the students to use these strategies to create additional subquestions as the discussion proceeds. As a result, the students learn strategies for creating subquestions, researching answers, and answering questions. Once they have engaged in this activity, the teacher shows the students how they can use their answers to the supporting questions to build an answer to the critical question. Finally, the teacher prompts the students to use a strategy to apply that answer to other situations and circumstances, including real-world usages that the teacher poses. During the discussion, the teacher and students construct a Question Exploration Guide containing all the pertinent information related to the critical question. (See Figure 5 for an example. See Bulgren et al., 2001, 2011, for other examples.) Through this process, they not only learn strategies for creating questions, researching answers, and stating answers, but they also learn strategies for applying what they have learned to new situations and circumstances.

Question Exploration Guide

1. What is the Critical Question?
How does understanding photosynthesis provide ideas for stopping global warming?

2. What are the Key Terms and explanations?

Photosynthesis	The process used by a plant to turn CO_2 into O_2, while making food for itself.
Global warming	The gradual increase in the overall temperature of the Earth's atmosphere.

3. What are the Supporting Questions and explanations?

What causes global warming?	A build up of CO_2 in the atmosphere.
What creates CO_2 in the environment?	Car exhaut, cattle, factories, coal-burning power plants
What uses CO_2?	Trees and plants use CO_2 in the environment to create their own "food" through photosynthesis.

4. What is the Main Idea Answer?
People need to create more opportunities for photosynthesis to reduce CO_2 in the environment.

5. How can we use the Main Idea?
Exisiting plants and trees can be preserved, and additional plants and trees can be grown to absorb CO_2 and reduce the effects of global warming. In addition to terrestrial plants, aquatic plants in the Earth's streams, rivers, lakes, and oceans can also be preserved or grown to absorb CO_2.

6. What is a Real-world Use?
How does saving the rainforest in Brazil help to reduce global warming?

FIGURE 5 Sample question exploration guide.
Note: Adapted from "*The Question Exploration Routine: Instructor's Manual,"* by J. A. Bulgren, B. K. Lenz, D. D. Deshler, and J. B. Schumaker, 2001, Edge Enterprises, Inc. Printed here with permission from the authors.

One Original Validation Study[1] for the Question Exploration Routine

In one study on the Question Exploration Routine (QER), Bulgren et al. (2011) focused the instruction on science in-

[1]Please note that there are two additional published studies on the Question Exploration Routine that validate the use of the routine within inclusive classes (Bulgren et al., 2009; Bulgren et al., 2013).

TABLE 4
Results of the Original Validation Study for the Question Exploration Routine

			Means		Between-Group Effects		
Study, Sample, & Design	*Measures*	*Group*	*Pre*	*Post (SD)*	*Statistic*	*p Value*	*Effect size*
Bulgren et al. (2011) $N = 116$ 7th Grade students $n = 11$ LA Students $n = 49$ AA Students $n = 39$ HA Students $n = 17$ Students w/D CBPO design	Chemical Weapons Test Score	CC—All St.	–	45.98% (16.92)	$F(1, 5.7) = 27.8$	$p < .002^{*}$	$d = 1.42^{c}$
		EC—All St.	–	71.70% (18.67)			
		CC—LA St.	–	**39.38% (20.08)**			$\mathbf{d = 1.68}^{c}$
		EC—LA St.	–	**70.00% (16.20)**			
		CC—AA St.	–	**45.56% (17.67)**			$\mathbf{d = 1.61}^{c}$
		EC—AA St.	–	**73.86% (17.52)**			
		CC—HA St.	–	**49.38% (14.69)**			$\mathbf{d = 2.04}^{c}$
		EC—HA St.	–	**78.67% (13.95)**			
		CC—St. w/D	–	**43.57% (18.42)**			$\mathbf{d = 0.50}^{a}$
		EC—St. w/D	–	**53.75% (22.16)**			
	Biological Weapons Test Score	CC—All St.	–	48.30% (17.54)	$F(1, 10.2) = 18.7$	$p < .001^{*}$	$d = 1.16^{c}$
		EC—All St.	–	69.92% (19.91)			
		CC- St. w/ LA	–	**49.00% (13.41)**			$\mathbf{d = 0.02}$
		EC—St. w/ LA	–	**48.75% (15.06)**			
		CC—St. w/ AA	–	**47.27% (16.16)**			$\mathbf{d = 1.20}^{c}$
		EC—St. w/ AA	–	**68.89% (19.82)**			
		CC—St. w/ HA	–	**55.00% (18.42)**			$\mathbf{d = 1.50}^{c}$
		EC—St. w/ HA	–	**80.21% (14.99)**			
		CC—St. w/D	–	**38.13% (19.26)**			$\mathbf{d = 1.27}^{c}$
		EC—St. w/D	–	**62.80% (19.55)**			

Note. Bolded means and effect sizes were not reported in Bulgren et al. (2011). Bolded effect sizes were calculated using calculators provided by Lenhard and Lenhard (2016).
CBPO = counterbalanced posttest-only design; CC = control condition; EC = experimental condition; St. = student; LA = low achieving; AA = average achieving; HA = high achieving; D = disabilities.
[a] Reflects small effect size.
[b] Reflects medium effect size.
[c] Reflects large effect size.
[*] Indicates statistically significant *p* value.

formation. They used a counterbalanced design with random assignment to conditions and employed a test similar to tests employed in subject-area classes. Two critical (and parallel) questions were chosen for the lessons: one was related to biological warfare ("Why are biological weapons such a great danger?") and the other was related to chemical warfare ("Why are chemical weapons such a great danger?"). Parallel scripts were written for both questions, and lesson plans containing the same information were created for use with the QER and with the lecture method. Participants were 116 students in seven inclusive 7th-grade classes. A counterbalanced design was used whereby each student experienced both conditions, with the order of conditions and topics randomly assigned to the classes. Thus, the classes served as each other's controls. The same instructor, Bulgren, provided all the instruction. A written test, which included matching, multiple-choice, and short-answer items about the two topics that were randomly intermixed, assessed student knowledge. The scores of students in several subgroups were monitored: students with disabilities, low achievers, average achievers, and high achievers.

The results of the Bulgren et al. (2011) study are displayed in Table 4, including the mean test scores for the whole student groups and the subgroup, as well as the between-group comparisons. The whole group of students who participated in the routine while learning about the chemical weapons topic earned significantly higher percentage scores on the chemical weapons test items than students receiving the lecture about chemical weapons, representing a very large effect. The comparisons among the subgroups also yielded significant differences between the experimental and control students in each subgroup, with the students participating in the routine earning significantly higher scores than those participating in the lecture. These differences represented large effect sizes for the low achievers, average achievers, and high achievers, whereas the difference for the students with disabilities represented a medium effect size.

With regard to the percentage of students in the subgroups who earned "passing" scores (i.e., a test score of 60% or above) for the test items associated with chemical weapons, mean percentage scores for the students participating in the QER versus the lecture method were: 77% versus 27% for the students with disabilities, respectively; 86% versus 50% for the low achievers, respectively; 93% versus 71% for the average achievers, respectively; and 100% and 100% for the high achievers, respectively.

On the test items related to biological weapons, the whole group of students who participated in the QER instruction during the biological weapons portion of the lesson earned significantly higher scores overall than students who participated in the lecture about biological weapons. The average achievers, high achievers, and students with disabilities subgroups mirrored this pattern with the students who participated in the QER earning significantly higher scores than the students who participated in the lecture in each case. All of the effect sizes were large. A significant difference was not found between the LA subgroups.

The subgroups of students earning mean percentage scores at or above the "passing" level on the items associated with biological weapons for the QER versus lecture treatments were: for the students with disabilities, 36% and 12%, respectively; for the low achievers, 75% and 29%, respectively; for the average achievers, 93% and 54%, respectively; and for the high achievers, 100% and 83%, respectively.

DISCUSSION

In sum, the original development and validation work on the four Content Enhancement Routines featured above has shown that when a routine is used, students learn and retain more information than when the lecture method is used. Further, with a few exceptions, this research shows that enhanced learning is experienced by all subgroups of students in inclusive classes who participate in a Content Enhancement Routine. In one instance, high-achieving students earned high test scores in both sets of conditions (see Bulgren et al., 2002), possibly because they had some background knowledge about the topics. In another case, the low-achieving students in both conditions earned similar mean post-test scores (see Bulgren et al., 2011). In all other cases, the subgroup that participated in the routine earned a higher mean test score than their paired subgroup that received the lecture condition. Importantly, in every case, the students with disabilities subgroup that participated in the routine earned a mean test score that was significantly different from their paired subgroup, representing either a medium or large effect size.

Interestingly, in many cases, students who were previously earning failing grades on tests were propelled into the passing range by their enhanced learning. In three of the studies,[2] only about 25% of the students with disabilities were passing the test when the lecture method was used. After participating in the routine in all four studies, about 75% of the students with disabilities were passing the test. A larger percentage of the students in the other experimental subgroups were passing the tests as well (a mean of 85% of the low achievers, 91% of the average achievers, and 97% of the high achievers). This result is a socially significant outcome that can potentially enhance the quality of students' lives since test scores form the majority of a student's course grade in secondary courses (Putnam et al., 1992; Schumaker & Deshler, 1984). Logically, students who pass their courses are more likely to earn course credit, stay in school, and graduate (e.g., Johnson et al., 2005).

Meaningfully, this group of validation studies, although each is focused on an individual Content Enhancement Routine, lends some credence to the notion that the Content Enhancement Approach as a whole is effective. All four of the routines reviewed herein include the same three-phase sequence of instruction (i.e., "Cue," "Do," and "Review"); high levels of student active academic responding through writing, reading, and speaking; a coconstructive partnership and discussion between the teacher and students; and a visual graphic device that depicts the relationships among the pieces of information in a concrete way. The most important information is displayed, and, as such, is distinguished from unimportant information in a learner-friendly way. As a result, students understand and retain the information longer. Thus, the routines are parallel in their structure and procedure, and this group of validation studies provide some support for the Content Enhancement Approach as a whole. Because no study has tested the effects of several Content Enhancement Routines together, a firmer conclusion cannot be drawn about the approach as a whole. Nevertheless, the current authors are not aware of any other approach to general education subject-area education that consistently produces socially significant gains for all subgroups of students including students with disabilities.

Strengths and Limitations

The studies reviewed here have some strengths as well as some limitations. First, they were all conducted in schools with information derived from subject matter being taught in general education courses to secondary students. Thus, their general application to general education settings can be assumed. Second, they all employed experimental designs that controlled for the effects of extraneous variables. Thus, the validity of their results can be assured. Third, a combination of measures was used. In one study, the measurement instruments included publisher-made tests and teacher-made tests (Bulgren et al., 1988). In other studies, the measurement instruments were tightly controlled, researcher-constructed tests that were reviewed by experts (e.g., Bulgren et al., 2000) and that were formatted similarly to the types of tests given in today's schools. Regardless of the type of measure, though, the same types of results were achieved: the subgroups of students demonstrated performance gains. Furthermore, in one study (Bulgren et al., 1988), the regularly assigned teachers created the graphic organizers and taught the regularly scheduled unit content to their regularly scheduled students. Moreover, this study took place over time across numerous content units. Thus, the Bulgren et al. (1988) study lends some credence to the notion that teachers can create the organizers and apply the routine to their subject-matter content.

With regard to limitations, with the exception of the Bulgren et al. (1988) study, the instructor for three of the routines was the researcher. Additionally, with the exception

[2] In one of the studies (Bulgren et al., 1988), 57% of the students with LD were passing the test during baseline. This was an outlier compared to the other studies, possibly because the test was a publisher-made test, and the tests used in the three other studies were researcher-made tests.

of the Bulgren et al. (1988) study, the information taught was carefully chosen and controlled to correspond to the measurement instruments, and the graphic organizers were created by the researcher. The time frame was also carefully controlled to be one or two sessions. Thus, three of the studies, although they took place in schools under typical school conditions, were limited by their restricted use of a single instructor and tightly controlled content and measures. Nonetheless, because the instructor was a certified teacher, the limited content was derived from actual content being taught in the schools, and the format of the tests was similar to tests being given in today's schools, the studies are expected to have some generality to today's school conditions.

Relation to Other Research

The studies reviewed in the current article join a small but growing number of studies related to the education of secondary students with disabilities in inclusive general education subject-area courses. Dexter and Hughes (2011), for example, conducted a meta-analysis that found that graphic organizers are associated with increases in vocabulary knowledge, comprehension, and inferential knowledge in students with LD in core-content classes like English, science, and social studies. This meta-analysis provides support for the graphic organizer element that is present in all of the Content Enhancement Routines. Additionally, Scruggs et al. (2012) tested the use of a peer-mediation routine in inclusive secondary classrooms. They found a significant difference between groups' performance on social studies tests. Another team led by Vaughn has tested the use of a routine called "Promoting Adolescents' Comprehension of Text" (PACT). As a part of this effort, six randomized controlled trials involving a total of thousands of students have been conducted (see Swanson & Boucher [2021] for a review, and Wanzek et al. [2016] for an example). The results have shown that students with disabilities who have participated in PACT lessons outperform their peers with disabilities in the control condition on measures of content knowledge, vocabulary, and content reading comprehension. When Maciver et al. (2018) conducted focus groups and interviews with 125 educators to determine what they considered to be best practices in inclusive classrooms, they named structures, routines, and teacher-led learning strategies. Thus, researchers in this area seem to be creating innovative routines that not only produce improved performance for students but also are considered acceptable by educators.

Educational Implications

The results of the reviewed studies lead to certain implications for instruction in general education subject-area courses. Regardless of whether students with disabilities are enrolled in the courses, the Content Enhancement Routines featured herein are likely to produce improved performance for low achievers and average achievers, and sometimes for high achievers. (Gains are sometimes not realized by high achievers because they earn pretest scores at the ceiling level.) When students with disabilities who are normally enrolled in these classes are included, they also make significant gains. The performance of none of the subgroups is harmed by the use of the routines, and many more students pass the tests when the routines are used as opposed to when they are not used. Thus, the reviewed Content Enhancement Routines are appropriate for use in general education courses in which all these types of students are enrolled. In order for teachers of these courses to be trained to use the Content Enhancement Routines, their coursework will need to include information and models of how the routines work as well as practice in using the routines in their practicum experiences. They will need experience in planning subject-area content for use in the routines and then in using the routines with students.

Moving Forward on the Research-to-Practice Journey

Because of their strengths and because of the similarities between the study conditions and today's schools, the studies reviewed here on individual Content Enhancement Routines represent a group of studies that show not only that each routine has value in inclusive classes, but also that the group of studies as a whole has value in terms of producing positive effects for subgroups of students enrolled in those classes. For most researchers, the research-to-practice journey often stops here; they develop and validate the effects of an innovative instructional program, celebrate, and move on to some other frontier. Not surprisingly, once the Content Enhancement Routines were shown to produce positive effects in terms of student performance, and once the validation studies about individual routines were published, educators started to ask the developers to provide training to teachers across the country. The researchers wanted to ensure that the training that they provided to teachers resulted in high-quality implementation as well as positive student outcomes that were similar to the outcomes reviewed here. As a result, the developers continued the research-to-practice journey by focusing on professional development.

Just as shown in Figure 1, they developed materials and methods for providing classroom materials and professional development sessions for teachers. For example, after meeting with teachers and asking what features and formats they liked in instructor's manuals, they created an instructor's manual for each routine. They created training materials, including visual aids, PowerPoint presentations, workshop agendas, training guides, and workshop activities to be used for each session with teachers. They tested out these materials themselves in workshops that they delivered live, and they gathered feedback. They then revised the materials as indicated by the workshop participants.

When the task of providing workshops for the nation's schools became unwieldy, they wrote additional grants to provide instruction to professionals at teacher-training institutions and in state departments of education, school districts, and state agencies to provide their own workshops using the refined materials. In turn, these professionals not only provided workshops to individuals in their states, but they also provided additional feedback to the developers, and additional refinements were made in the materials as indicated. In other words, the cyclical nature of the interaction at this point in the research-to-practice process evolved and continues to involve a continuous process of give and take between the field of education and the original researchers/developers of the routines.

Lessons Learned

Many, many lessons were learned on this 35-year journey. At the center of the research-to-practice process, the research team learned that the effort had to be sustained across many years. As a result, funding had to be obtained over and over. This necessity meant that grant proposals had to be tailored to the goals of granting agencies while maintaining a central focus on instructional methods for inclusive general education courses. Funding had to be obtained not only for the validation research but also for creating the professional development sessions. Additionally, for all of these methods and materials to be constantly available to the nation, a staff was required to produce and disseminate them along with newsletters and websites. At the level of the professional developers, an organization had to be formed and maintained to certify individuals and provide them with new information and update conferences. Now that the organization has been in place for many years, turnover is occurring; the professional developers and professors are retiring and are no longer providing workshops and teaching courses. Thus, new professional developers must be continuously recruited, trained, and maintained. At the district and school level, the researchers learned that teacher turnover is high, so even though the staff of a school has learned to use new methods, within a few years many of the teachers will have moved to other schools, moved up the ladder to become administrators, or departed teaching altogether. Administrators who make the original adoption decisions also move on. Schools often do not have the funds to provide additional instruction to their new teachers or even to provide initial instruction. At the state level, state initiatives and state technical assistance agencies have been created and died, and key leaders have retired. In other words, maintaining a national professional development operation requires ongoing effort and nurturing. As a result, the research team began to consider alternatives to live professional development. The remainder of their journey to date is described in the next article in this issue (see Fisher & Schumaker, 2021 for Part II of this article).

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