

# Curriculum Modification

Curriculum Enhancement

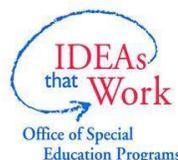
By Tracey Hall, Ph.D. and Ge Vue, National Center on Accessing the General Curriculum; Nari Koga and Stephanie Silva, Boston College

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# Curriculum Modification

## Introduction

Modifying existing general curriculum has been an effective way to create more accessible learning environments to support all students and their teachers in various educational contexts. There are many terms in use regarding changes made to curriculum, such as enhancements, accommodations, overlapping, and adaptations. We differentiate *curriculum modification* from *curriculum enhancement* for the purposes of this paper. In this way, we can clarify the definition and nature of curriculum modification to emphasize its effectiveness in improving education for all children, and to provide vivid examples and useful resources which will enrich actual classroom practices for diverse learners. Although both ideas, *enhancement* and *modification*, become pivotal when we consider improving accessibilities of general curricula in relation to individual students' needs, the approach, design, and methods that result from each idea may differ significantly.

Curriculum *enhancement* is most likely to be built around existing general curriculum and to involve teachers' alterations of curriculum. Frequently, teachers will enhance curriculum with additions of instructional strategies. Frequently enhancements are created to evaluate and teach adequate background knowledge in preparation for a new task. Additionally, teachers may incorporate a variety of instructional materials and procedures to meet students' needs, including the use of co-teaching and/or instructional collaboration.

Curriculum *modification* differs from curriculum enhancement in that modification is a more extreme alteration to the curriculum than that of an enhancement. Modifications involve combinations of altered content, conceptual difficulty, educational goals, and instructional method versus building scaffolding and bridges between existing curriculum and people involved in the educational process. Such differentiation between curriculum modification and curriculum enhancement is based on ranging degrees in which our educational approach becomes distinct from or maintains the similarities to existing general curriculum. In other words, educational practices in which student and teacher interactions differ from those designed in existing general curriculum are present to a greater extent when curriculum is *modified* than when enhanced.

There are numerous ways curriculum modifications are put into practice for different purposes and outcomes on various levels (such as individual, classroom, and school-wide). Due to a flexible nature and countless applications, curriculum modification often remains an ambiguous concept and is understood as an umbrella term to include multifarious aspects of everyday teaching practices. We have refined our definition of curriculum modification based on understandings of its nature and potentialities. The discussion below introduces a way to understand the concept and some concrete practices of curriculum modification through to presenting how we have defined curriculum modification, how components can be categorized, what research says about its effectiveness, and how such empirical evidence can be applied to

general education settings. We provide, in the final section, a list of useful web resources and related literature for the reader.

## Definition

It is important to note that no single definition of curriculum modification exists. Many researchers offer many definitions from various fields of discipline. In other words, the practice of curriculum modification has been discussed in different languages by many researchers from various specialty areas in education. For instance, in addition to the most frequently used terms, *accommodation* and *adaptation*, some use terms such as *alteration*, *differentiation*, *change*, *revision*, *enhancement*, *compacting*, *integration*, and *scaffolding* to discuss teaching events involving curriculum modification. Another issue is that discussions regarding curriculum modification are often interwoven with ideas of strategy use for intended educational purposes. This creates a situation in which we face the difficulty of separating literature focusing on teaching strategies from those focusing on curriculum modification.

Our challenge is to clarify these ambiguities and to refine the definition of curriculum modification. In this review, we define *curriculum modification* as *modified content, instruction, and/or learning outcomes to meet diverse student needs*. In other words, curriculum modification is not limited to instructional modification or content modification but includes a continuum of a wide range of modified educational components. Similarly, Comfort (1990) defines curriculum modification as “the adapting or interpreting of a school’s formal curriculum by teachers into learning objectives and units of learning activities judged most reasonable for an individual learner or particular group of learners” (p. 397). Curriculum modification involves change to a range of educational components in a curriculum such as content knowledge, the method of instruction, and students’ learning outcomes, through the alteration of materials and programs (Comfort, 1990; King-Sears, 2001; MacMackin & Elaine, 1997; Reisberg, 1990).

Although some may distinguish instruction from curriculum and argue that mere instructional modification should not be considered as curriculum modification, defining curriculum modification requires us to understand curriculum as a broad concept which involves various educational components and people involved in educational processes. After all, content, instruction, input and output inseparably construct daily teaching and learning. We also conceive school curriculum as a framework for guiding teachers (Comfort, 1990). In short, the way that we interpret curriculum influences our understanding of curriculum modification. Reisburg (1990) lists examples of *the modifications of content*, such as teaching learning strategies, simplifying concepts or reading levels, teaching different sets of knowledge and skills needed by students, and setting up specific objectives and examples of *modifications to instructional methods* including reducing distractions, altering the pace of lessons, presenting smaller amounts of work, clarifying directions, and changing input and response modes. All of these teaching events should be considered as examples of *curriculum modification*.

For the purpose of this report, we have adopted the categorization of curriculum modification suggested by King-Sears (2001). King-Sears identified four types of curriculum modification: (a) accommodation, (b) adaptation, (c) parallel curriculum

outcomes, and (d) overlapping curricula on a continuum. This categorization represents the relation between modified curriculum and general curriculum in terms of differences and similarities in educational input including content knowledge and conceptual difficulty, educational output including educational goals, and methods of instruction. The extent to which a modified curriculum differs from the general curriculum becomes greater as educational practice moves from accommodation to overlapping curricula. For instance, in accommodation, the only educational components which may differ from general curriculum are instructional method and educational goals, whereas, in overlapping curricula, all components—input, output, and instructional methods that students receive—can be totally different from those designed in general curriculum. As conceptualized along this continuum, curriculum modification that King-Sears suggests contains a wide range of educational practices and shares the essence of the aforementioned definition of curriculum modification: *modified content, instruction, and/or learning outcomes for diverse student needs*. Modifications identified by King-Sears, for example, range from an educational practice of simply providing an audio book to some students who have reading difficulties during reading lessons to an educational practice of having some special needs students work on individual (IEP) goals, such as following directions, while they engage in general science lessons. Moreover, these four types of curriculum modification, according to King-Sears, are extensions of curriculum enhancement within the process for teachers to determine the degree of accessibility of their classroom for students with disabilities. In other words, curriculum modification, in King-Sears' view, is a suggested step to take when curriculum enhancement alone is not effective to achieve objectives for inclusion. King-Sears' clear categorization and analysis of the components of curriculum modification is valuable for educators to capture the essence of curriculum modification. As stated above, her categorization consists of a wide range of educational practices. Since curriculum modification is practiced in numerous ways, it is important to broaden the definition rather than limiting it to particular events.

## **Components and Features**

As noted above, the components of curriculum modification are well categorized by King-Sears (2001) into four types: (a) accommodation, (b) adaptation, (c) parallel curriculum outcomes, and (d) overlapping curricula. Switlick (1997) explains that the purpose of modifying curriculum is “to enable an individual to compensate for intellectual, physical, or behavioral challenges” and to create learning environments which “allow the individual to use existing skill repertoires while promoting the acquisition of new skills and knowledge” (p. 236). We need to understand that these are the purposes which underlie the four types of curriculum modification identified by King-Sears.

In the following section, brief explanations of each type of curriculum modification with examples from actual classrooms are presented. Actual educational practices reflecting modified curriculum vary in many ways, as modification occurs in various educational settings across diverse subject areas, students, assignments, assessments, evaluations, and so on. Presenting examples for *all* educational situations is beyond the

scope of this paper. Therefore, we selected a range of examples across four types of curriculum modification with a special focus on the examples from integrated general classrooms. For instance, the section regarding accommodation involves an example of using assistive technology in writing class for students with learning disabilities and an example of using audio books for English Language Learners in a reading lesson. Likewise, various settings (math, language arts, social studies, and science) and learners (students with moderate to severe disabilities as well as students identified as gifted and talented) appear in the examples presented across the four types of curriculum modification.

Following the description and examples of each curriculum modification type is a table illustrating comparisons among four types of curriculum modification in relation to components modified and the extent to which modified curricula differ from the general curriculum. The table helps us visually recognize that, as we move forward from accommodation to overlapping curricula, focused components shift from instruction-oriented to content-oriented and that educational practices reflecting modified curriculum become more distant from educational practices based on general curriculum.

## **Accommodation**

The term *accommodation* is used to mean a modification to the delivery of instruction or method of student performance and does *not* change the content or conceptual difficulty of the curriculum (see Table 1). Both teachers and students can play a role in the changes to instructional methods in order to achieve the same intended instructional outcomes suggested in general curriculum. Examples of accommodation are countless. Some include incorporating different types of teaching devices and techniques (such as use of audio or other formats as an alternative to print), technology, graphic organizers, and pictorial representation; and changing the amount of input, time-frame for learning, and levels of support for individual students' needs.

Among these examples, using assistive/adaptive technologies typically exemplify an accommodation to general curriculum. Bray, Brown, and Green (2004) define assistive/adaptive technologies as "content-free technologies" (p. 34) which does not address curriculum or promote specific learning but rather helps students overcome inaccessibility due to individual differences. In an actual classroom, a student with physical disabilities may use computer input devices, such as a trackball mouse which requires less hand movement or an alternate keyboard with extra large keys, to complete his/her writing task. In this case, the content and difficulty level of tasks remain the same as the tasks in which other students in the class engage. An accommodation through the use of assistive/adaptive technologies allows students to complete their tasks required in general curriculum which would be difficult to complete otherwise. Another example of accommodation is making audio versions of books available for students who are English Language Learners (ELLs) and students with print disabilities when they engage in reading sessions focusing on reading comprehension skills. Instead of providing the traditional written or printed form of text, teachers can have these students work individually or in a small group to read an assigned book with auditory support. Again, through this type of accommodation, students with diverse needs can acquire the same content knowledge as other students and move on to the

next stage of learning with them. In the case of ELLs, students can comprehend the text with audio support and then participate in the follow-up activities with other classmates based on their understanding of what was read. Frequently, teachers regard ELL students' developing language proficiency as a disadvantage which causes a necessary lag-behind (Valdes, 2002). As a result, teachers may provide curriculum modification with more content-focused alteration, which simplifies the content, may change the standards and goals, does not provide enough cognitive challenge and academic stimulus, and does not help students' acquisition of the English language. Although it is important to understand that acquiring a second language, especially academic language, is not a quick fix and takes many years of instruction (Cummins, 2000), teachers also need to know that ELLs, like other general students, should receive an appropriate cognitive challenge with appropriate conceptual difficulties and a sense of belonging to their class regardless of their developing language proficiencies (Igoa, 1995). When used with students with appropriate language proficiency levels, an accommodation to general curriculum can be a powerful tool to support ELL students' unique linguistic, academic, and social needs.

Switlick (1997) has listed other examples of accommodations, such as requiring completion of every other word problem on a math worksheet or providing for oral performance instead of written. As we see in these examples, accommodation is not a change of educational input designed in general curriculum, such as content knowledge and the conceptual difficulty of the subjects. Rather, accommodation is a modification of instructional methods intended to meet individual student's needs of acquiring necessary input from lessons. The information that students receive remains the same. However, an accommodation to curriculum modifies the way that students acquire and/or respond to the information.

Another important point to add is that the intended goals of accommodated curriculum may change from those of general curriculum depending on educational contexts. For instance, using an audio book in a reading comprehension lesson creates an opportunity for students to use their listening skills in addition to reading or decoding skills. If the students were English-speaking children with reading difficulty who had already established English listening skills, the intended goals of curriculum would remain the same as those in general curriculum. However, if the students were ELLs who were still in the process of developing their listening skills, teachers could indicate an additional goal for them (which is the development of listening skills). Thus, accommodation has a flexibility of adjusting intended educational goals based on context.

## **Adaptation**

*Adaptation* is a modification to the delivery of instructional methods and intended goals of student performance that does not change the content but does *slightly change* the conceptual difficulty of the curriculum (see Table 1). Adaptations usually require more teacher effort and time than simply changing instructional methods or access as in an accommodation. An adaptation is a goal-driven process: in order to decide on an adaptation to curriculum, teachers first need to specify intended goals for individual students. Again, examples of adaptation abound, and include providing differentiated

activities, homework, and evaluations, and using adapted or different instructional materials and activities for individual students.

Adaptations in integrated general classrooms often occur when teachers differentiate instruction. For instance, teachers can create writing lessons that meet individual students' unique needs by having students work on adapted assignments. While some students are engaging in a writing assignment individually, students with learning disabilities may work on their assignment in a small group with teacher support. The teachers may also modify the content of the writing activity depending on students' needs. While the teacher requires some students to compose using the five new vocabulary words from the lesson, the students with a learning disability may select three of the five new words from the lesson and make appropriate use of them in the context of their work. King-Sears (2001) suggests that a variation of this type of lesson can be providing students with disabilities fewer practice tasks. She also points out that reducing the amount of tasks seen in an accommodated instruction should be differentiated from that provided in adapted instruction. On the one hand, the *accommodated* instruction may modify the amount of tasks (for instance, teachers provide only five math problems to students with math difficulties while others work on ten problems) without changing the conceptual difficulty of the tasks. On the other hand, *adapted* instruction involves a slight change in conceptual difficulty to meet students' needs.

In another example provided by King-Sears (2001), a math teacher may instruct a student with a disability to work on mastering division of mixed fractions with like denominators while other students work toward mastering division of mixed fractions with unlike denominators. In this case, the conceptual difficulty of the knowledge that students with a disability need to acquire slightly changes although the content knowledge of mathematics, namely the concepts of divisions and fractions, remains the same. Switlick (1997) suggests other examples, including providing picture cards for key words in a story and using a calculator to complete a math assignment. Switlick also provides an adaptation planning worksheet (p. 245) for teachers who are interested in incorporating adaptation into their instruction.

Thus, adaptation involves not only the modification of instructional methods but also includes a slight change in conceptual difficulties introduced to students. Like accommodation, adaptation occurs within the same learning content. In many cases, adaptation should be practiced when teachers determine that a student is able to learn the same content knowledge as other students if a slight change is made to modify conceptual difficulty.

## **Parallel Curriculum Outcomes/Parallel Instruction**

*Parallel curriculum outcomes* are modifications to the delivery of instruction and to intended goals regarding student performance. Like adaptation, parallel curriculum outcomes do not change the content knowledge and the underlying principle of the educational goals for individual students. The difference between adaptation and parallel curriculum is the extent of change in conceptual difficulty. While adaptation slightly changes the conceptual difficulty of curriculum, parallel curriculum outcomes involve a *significant change* of conceptual difficulty (see Table 1).

Similar to accommodation and adaptation, the practice of parallel curriculum outcomes depends on educational contexts and individual student needs. There is a range of application to this type of modification and students with varying learner characteristics and abilities benefit from parallel curriculum outcomes. For example, many students identified as gifted and talented require more advanced or challenging conceptual difficulties in instruction and application. Therefore, the significant change of conceptual difficulty seen in parallel curriculum outcomes often suits the curriculum modification needed for these students. Many educators synonymously use the term *enrichment* with the term parallel curriculum outcomes when addressing such curriculum modifications. Students with varying disabilities also benefit from the parallel curriculum type of modification. For instance, King-Sears (2001) described a classroom situation in which most students develop science projects that include analysis of cause-and-effect problems. In the same classroom, a student with multiple disabilities may engage in a science project with a focus on one experimental process. In this way, teachers are able to include the student with multiple disabilities in the same content lesson as all students and support the student with disabilities so that she/he may achieve the appropriate educational goals.

Other examples suggested by Switlick (1997) include providing special needs students in English/Language Arts classes a paper with all or part of a story and asking them to locate target words or letters while other students are reading the story; having students with special needs complete worksheets for counting from 1 to 10 while other students are assigned a math worksheet on fractions; and allowing some students to orally report three things remembered from listening to others reading the newspaper in a citizenship/current events class, while other students read aloud and answer a series of questions.

Thus, parallel curriculum outcomes do not change the broader content knowledge of a lesson but significantly change the *conceptual difficulties* for students. The educational practices categorized under parallel curriculum outcomes closely connect to what Switlick (1997) described as a concept of “partial participation” (p. 236)—an underlying concept associated with modification. Switlick explains that we fundamentally believe that it is appropriate for diverse students, especially students with severe disabilities, to participate in the general education classroom even though they may not acquire the same level of conceptual understanding as other classmates and that teachers can pursue this practice by applying parallel outcomes/instruction curriculum modifications. As Switlick indicates, the use of parallel curriculum outcomes is a modification that “goes a step beyond what is usually considered when adapting instruction” (p. 244). Modifying the conceptual difficulty of curriculum in a significant way creates a learning environment in which we can broaden the idea of inclusion to a wider range of diversity among students.

## **Overlapping Curricula/Overlapping Instruction**

*Overlapping curricula* is a modification to curriculum such that the modification creates *overlapping* or *common* goals for learning outcomes of diverse students. Overlapping curricula is not a direct modification of general curriculum. Rather, it is an incorporation of specific individual goals and expectations for students with diverse needs. Teachers can practice overlapping curricula when expectations for specific goal accomplishments

in general education are presented. Overlapping curricula enables diverse students to be involved in general education curriculum activities and promotes the idea of partial participation. There are various ways to practice overlapping curricula. In most cases, the components of curriculum, such as background knowledge, conceptual difficulties, and methods of instruction, for special needs students are designed very differently from those for general education students (see Table 1). Practicing overlapping curricula sometimes requires teachers to creatively design and provide shared educational activities, such as cooperative learning and peer-mediated interventions. In such shared activities, the educational goals and expectations for the students with diverse needs overlap with those for general education students.

While students with diverse needs are learning to achieve their individual educational goals (for instance vocational and social skills development) they also are able to be involved in the same content lesson with their general education classmates. Based on the modified intended educational goals, educational input (content knowledge and conceptual difficulty) and instructional methods become different from those designed in general curriculum. King-Sears described an example in which a student with emotional disturbance may have an IEP goal to develop appropriate interactions with peers in a small group setting. Although this student may never engage in social studies activities at the same conceptual levels as other students or never develop content knowledge in the subject, teachers can provide him/her with an appropriate task to complete in a small group in order to create an opportunity to interact with others. When the general curriculum also focuses on students' interaction as one of the intended goals for the social studies lesson, there is an overlap evident between the intended goals for students with special needs and those for regular students. In short, this type of modification allows students with specific needs to be involved in general education curriculum activities while accomplishing different curriculum goals.

The following example depicted in Switlick (1997) clearly describes a classroom practice using overlapping curricula. The student in this example, Jamie, has objectives to make eye contact and acknowledge an interpersonal interaction using audible sounds:

*Jamie has a tray on his wheelchair. He holds on his tray the manipulatives students are using during math class. As students pick up their materials from Jamie's tray, they speak to Jamie. To meet his instructional goal, Jamie should look at each student and acknowledge the greeting with an audible sound. The same interaction is duplicated as students exchange materials and return materials (p. 246).*

Thus overlapping curricula provides Jamie the opportunity to practice appropriate social interactions with peers in the general classroom setting. At the same time, his peers also benefit from the social interaction and are able to prepare their manipulatives and engage in a math activity efficiently with Jamie's help.

Like other types of curriculum modification (accommodation, adaptation, and parallel curriculum outcomes), examples of overlapping curricula can be innumerable.

Additional examples from the work by Switlick (1997) include having a student with a severe physical disability use an adaptive switch to activate an audio recorder and work on holding up his head for increased amounts of time while other students are recording

a rough draft of a play they are creating, and having the same student make sure everyone in the class has a test tube and a worksheet while other students are engaging in a chemistry experiment in small groups.

As we see in these examples, the educational practices in which the student with special needs engage for their intended goals and those in which general education students engage for their intended goals may create mutual benefit due to the overlap evident in their goals. Through applying overlapping curricula to general curriculum, teachers are able to create a learning environment where students with special needs play meaningful roles in a classroom and where not only students with special needs learn from being included in a general classroom but also their general education peers have an opportunity to learn and receive supports from the students with special needs. The following table contains the four types of curriculum modification features described above. The first column contains a list of the modifications and the top row contains curriculum components: content knowledge, conceptual difficulty, intended goals, and method of instruction. If a modification is evident in certain components, the table shows the extent of modification, for example, slight or significant. This table serves as a summary of curriculum modification ideas and information about the characteristics of each type thus enabling teachers to select which type would be most beneficial for their students.

**Table 1. Curriculum Components.**

<b>Types of Modification</b>	<b>Content Knowledge (input)</b>	<b>Conceptual Difficulty (input)</b>	<b>Intended Goals (output)</b>	<b>Methods of Instruction</b>
<b>Accommodation</b>	Same as general education curriculum	Same as general education curriculum	Same or modified	Modified
<b>Adaptation</b>	Same as general education curriculum	Slightly modified	Modified	Modified
<b>Parallel Curriculum Outcomes</b>	Same as general education curriculum	Significantly modified	Modified	Modified
<b>Overlapping</b>	Different	Different	Modified	Different

These explanations of four types of curriculum modification with the visual support of the table help to illustrate how the extent of changes to curriculum varies among the four types of curriculum modification categorized by King-Sears (2001) and Switlick (1997). As described, the extent of change shifts from less to more as we move forward from accommodation through overlapping curricula. The demands on teacher time and energy for planning and conducting lessons may also increase as we shift from modifying instructional methods for accommodated curriculum to creating individual

lessons for overlapping curricula with application in general education lessons with overlapping educational goals.

Although it seems to be true that accommodation is a less elaborate type of curriculum modification and that overlapping curricula is the most elaborate type contrarily, the degree to which each modification type is different from general curriculum does not correspond to the degree of supports needed by individual students. In other words, an accommodation can be an excellent tool to instruct students with severe disabilities who need extensive amounts of support, whereas students with minor disabilities may benefit from overlapping curricula depending on each individual student's educational goals and the instructional episode.

The educational practices for all types of curriculum modification are as diverse as the educational contexts, including subjects, settings, and students. In fact, classroom teachers may practice different types of curriculum modification in a combined manner. In other words, we can easily imagine that a student who benefits from adapted curriculum may also receive positive supports from other types of curriculum modification. Also, in a classroom where differentiated instruction is practiced, various modifications may take place concurrently.

Categorizing each type of curriculum modification is extremely useful for teachers to understand the nature and potentialities of curriculum modification and to incorporate their understandings into actual classroom instructions. However, we should keep in mind that the success of modified curriculum requires teacher flexibility in instructional practices and broad views of curriculum itself. The next section will introduce literature providing empirical evidence of curriculum modification for diverse students.

## **Evidence of Effectiveness**

It is important that students with disabilities have meaningful opportunities to access the general education curriculum, interact with peers in the same classroom, and receive instruction from general education teachers. Findings from two large size studies showed positive correlations between the amount of time students with disabilities spent in the general education classroom and academic achievement. Cosier, Causton-Theoharis, and Theoharis (2013) examined a data set that included 1,300 elementary-aged students with disabilities within 180 school districts. The results showed that each hour which students with disabilities spent in the general education classroom resulted in a .49 point higher score on reading assessment and a .37 point higher score on math assessments. Hehir, Schifter, Grindal, Ng, and Eidelman's (2014) comprehensive review of special education in Massachusetts showed that students with disabilities in full inclusion placement outperformed similar students in substantially separate placement. Hehir, et al. looked at data of students with disabilities from 2006–2012 and followed 3 cohorts of students from 9<sup>th</sup> grade to graduation. They found that, on average, students educated in full inclusion classrooms earned higher scores on standardized, state-wide assessments and graduated high school at higher rates than similar students who were educated in substantially separate classrooms.

Together, both studies suggest that more access and time spent in a general education environment provided students with disabilities more opportunities to acquire the

academic knowledge and skills essential for post-secondary attainment and career readiness.

Curriculum modification is an essential ingredient for students with disabilities to access the general education environment. The empirical evidence regarding the effectiveness of curriculum modification is available in many studies. The following sections include the literature review of 15 empirical studies issued between 1989 and 2014 which report the impact of curriculum modification on various areas of interest and 4 conceptual studies relevant to the empirical findings. For the purpose of this report, which is to display empirical evidence of effectiveness, our main focus is on the empirical findings, and we use conceptual studies to supplement the background of reviewed empirical studies.

A total of 19 studies were identified and then organized into four major categories by area of impact for which the modified curriculum was designed: (a) modification designed for students' learning, (b) modification designed for behavioral reasons, (c) modification designed for inclusion, and (d) self-determination training to enhance modification. The majority of the studies are detailed in articles from major peer-reviewed journals, such as *Academic Therapy*, *Bilingual Research Journal*, *Behavioral Disorders*, *Journal of the Association for Persons with Severe Handicaps*, *Learning Disabilities: A Multidisciplinary Journal*, *Journal of Applied Behavior Analysis*, *Equity & Excellence in Education*, *Journal for Education of the Gifted*, *Gifted Child Quarterly*, *Journal of Early Intervention*, *Teacher Educator*, *Journal of Special Education*, and *Remedial and Special Education*—with a few exceptions of studies published in books.

## **Modifications Designed for Students' Learning**

***In 9 of 19 studies reviewed, the authors focused on demonstrated effectiveness of modifications designed for student learning, which include 7 empirical studies and 2 conceptual papers. This section contains three sub-sections based on the types of diverse students, namely general education students, English Language Learners, and gifted and talented students.***

### **Modification for General Education Students**

We found two empirical studies comparing the effect of modified curriculum to that of regular curriculum on general education students' learning performance, including engagement, motivation, and achievement, as well as teacher perceptions regarding the use of modified curriculum (Tieso, 2001). The number of studies focusing on the effectiveness of curriculum modification for general education students alone is limited since a majority of studies in this topic target student populations in need of modification to existing general curriculum. Tieso's (2001) qualitative study involved 12 mathematics teachers from different school sites (2 teachers used regular textbook curriculum, 10 teachers used the modified curriculum). From these classrooms, 6 students in grade 5 through 8 were selected for interviews. During the 3 weeks of data collection, Tieso investigated teacher and student perceptions regarding the necessity and effectiveness of modified math units and the academic achievements of the students after receiving the modified units. The curriculum was redesigned so modified units would provide enhanced learning objectives, authentic resources and assessment techniques,

engaging lesson introductions, and include an emphasis on the major principles and concepts of the discipline. The existing units of study were carefully aligned with constructivist teaching and learning activities and the teachers received training in curriculum modification. Data were collected through individual interviews, focus groups, observations, and examinations of students' artifacts.

The authors reported that teachers perceived the modified unit as more effective in motivating and engaging students. The modified unit also seemed to meet the needs of all students by challenging the students and posing high expectations. Based on these results, the author's indicate that students believed the modified units were more fun, complex, engaging, and challenging than a regular textbook unit. Additionally, the students showed pride in completing their final projects. In summary, the author stated that teachers and students preferred the modified unit, which involved hands-on activities, the infusion of writing into the math curriculum, the opportunity of collaboration among students, and the comprehensive and authentic nature of the final project.

A second study on curriculum modification by Moon and Callahan (2001) researched the effectiveness of curriculum modification on general education student's learning achievement. In this 2-year longitudinal study, a mixed method, curriculum modification was one of the interventions designed for a project called Support To Affirm Rising Talent (START). The subjects included 273 elementary students with diverse backgrounds in terms of race, ethnicity, and socio-economic status. The students were first or second graders from 16 schools in an urban school district and more than a half of them were from low socioeconomic environments. Curriculum modification in this study followed a constructivist approach, which emphasized a student-centered approach in modification. Curriculum modification involved various components of learning in daily classroom activities. Some modification practices included organizing lessons relevant to students' lives, considering a pattern of classroom interaction, and using materials familiar to students from varied cultural backgrounds. During the implementation of this curriculum modification, student's academic achievement was measured using a standardized norm-referenced measure in basic skills (vocabulary, reading, language arts, and mathematics).

The author's summarized their results as follows. In combination with other interventions incorporated in the START project, such as family outreach program and mentorship, curriculum modification positively affected the improvement of students' academic achievement, especially students identified as at-risk for academic failure. Students identified as at-risk were on grade level by the end of the project and the effectiveness of intervention remained evident one year after the project was completed. Thus, these two empirical studies showed some positive effects of curriculum modification for students' attitudes towards learning and their academic achievement. Considering the scarceness of empirical studies emphasizing the potential effectiveness of curriculum modification on all students, the significance of these studies is in their focus on diverse students in general education classrooms. Although Tieso's study did not discuss the diversity among the subjects, the subjects in the study by Moon, et al. (2001) involved diverse students with various ethnic, cultural, and socio-economic backgrounds. Their findings suggest that, when the design is student-centered and the practice is individually-focused, curriculum modification is effective for all students

regardless of their backgrounds. We are encouraged by these promising studies. However, such a small sample is inconclusive and we recommend additional research be conducted with a focus on student groups who require modified curricular units to access general curriculum.

## **Modification for English Language Learners**

We found two empirical studies (Buxton, 1999; Fradd, Lee, Sutman, & Saxton, 2001) and one conceptual study (Sparks, 2000) specific to students identified as English Language Learners (ELLs). The researchers focusing on curriculum modification for ELLs suggested that integrating students' unique linguistic and cultural backgrounds into curriculum is a key to make modified curriculum function successfully.

The first study was designed to demonstrate the effectiveness of a modified science curriculum on the accessibility of inquiry-based science curriculum for ELLs as well as regular English-speaking students (Fradd, et al., 2001). Curriculum modification, in this study, was a part of two large-scale science projects: the Promise Project and The Science for All Project.

Fradd's Promise Project involved 502 students in grade 4 with different linguistic and cultural backgrounds, including bilingual Hispanic, Haitian, and English-speaking children, and their teachers who shared students' language and culture. The researchers and teachers modified the curriculum to incorporate more open inquiry; as a result, students' academic achievement as reflected in test scores improved.

Teachers' insights contributed to identify the transitions and instructional materials required to move to the modified open inquiry. Teacher's knowledge of their students' language and culture also helped to identify students' specific needs.

The Science for All Project was a 3-year longitudinal project involving 900 students in grade 4 and their teachers. In this project, the science curriculum was modified such that inquiries would develop through a continuum of experiences ranging from scaffolded explicit instructions to student-initiated inquiries. The process of curriculum adaptation involved the integrating of specific linguistic components for the language and literacy development of ELL students. For instance, the modified curriculum incorporated the learning of specific language functions, such as describing, reporting, or explaining; and the promotion of vocabulary development in both English and the students' native languages. The modified curriculum also involved providing instructions in multiple representational formats such as drawings, charts, tables, graphs, and computer-developed simulations. Such modified curriculum contributed to develop inquiry-based science curricula for the ELLs and to increase academic achievement. The authors stated that "despite contextualized learning through hands-on activities, the benefits of science inquiry for ELLs may be limited without a concomitant focus on literacy development" (p. 493).

Although the major focus of this study was on the modification of materials, the results suggested that teachers' perceptions regarding the effectiveness of curriculum modification shifted from uncertain to preferable, and that such a positive shift of teacher perceptions would affect the successful practice of modified inquiries. This author also suggests that teachers can modify curriculum in a particular subject area with the input obtained from different subject areas. A crucial point is for teachers to

consider fulfilling students' needs using whatever input is available from the learning contexts. The results of this study indicate that the ELL students' academic success in science was closely connected to their language and literacy learning and that those students with diverse linguistic and cultural backgrounds benefit from the modified curriculum when their unique linguistic needs are integrated in curriculum. Existing modification strategies or instructional strategies identified as effective for a wide range of students may not support ELL students when their language proficiencies are not taken into account.

In another study, Buxton (1999) reported that integrating ELLs' cultural backgrounds is a key point for teachers to consider when modifying science curriculum. In this 3-year longitudinal study, the researcher examined the effectiveness of modified science curriculum designed within a project called the Science Theatre Project. The modified science curriculum involved a computer-based instructional methodology with inquiry-based and student-generated computer models. The purpose of this study was to examine how modified curriculum affected the students' learning and understanding of science inquiries and interactions. The subjects involved 26 students in grades 2 and 3, including Spanish-English bilingual children and English monolingual children in a two-way bilingual program. The underlying assumption of this study was that personal understandings of how science is practiced play an important role in students' academic success in science, and this assumption is evident in Buxton's statement, "the cultural and linguistic backgrounds that many of these students bring with them to school stress methods of argument, proof, and understanding of the natural world that are significantly different from the logico-deductive western epistemology that has given rise to modern science" (p. 148).

Qualitative data were collected through ethnographic field notes, classroom artifacts, and individual interviews with students and teachers. The results showed that the use of computer models was beneficial for the students' developing conceptual abilities, and that the change of students' conceptual abilities was essential for the creation of successful models. The significance of this study is the emphasis on student and teacher roles. Buxton emphasized that curriculum modification needs to be student-centered in a way that the content of modification is connected to students' own lives, and that students need to understand the value of their prior experiences and to help teachers tailor the instruction. Only when cultural backgrounds of ELL students are acknowledged and integrated in curriculum modification will they have a learning opportunity to comfortably use the language of science as a discourse of engagement in activities and to engage in content-based interactions with others.

The ideas from a conceptual study done by Sparks (2000) reinforces the importance of integrating students' cultural backgrounds into curriculum modification. In his study, Sparks specifically focused on Native American students. He suggests that curriculum can be enhanced through a process of incorporating Native American students' culture in the classroom curriculum, what he calls "cultural infusion" (p. 263). Cultural infusion is a way that students do not change their cultural beliefs but adapt to specific situations and acquire necessary coping skills. Based on his teaching and research experiences, Sparks asserts that school failure is less likely to occur and students' self-esteem increases when their culture is successfully incorporated into the modified curriculum.

He suggests that, for a culture-specific approach to curriculum modification, educators need to consider the following principles: (a) learning about students' lives, including specific tribe culture and individual family lives; (b) building the curriculum on positive images of students' culture not on negative stereotypes; (c) developing cultural sensitivity; and (d) learning about the characteristics of Native American learners, such as their visual presentations of knowledge, their lives in a highly oral culture, their preference of simultaneous processing rather than sequential processing, their preference of hands-on technique, their cooperative rather than competitive learning environments, their concepts of time and space, and so on.

Thus, the focus among the studies regarding effectiveness of curriculum modification for ELL students are on the importance of integrating students' linguistic and cultural backgrounds into a modification process. A common suggestion evident among these studies is that teachers need to understand the characteristics and specific needs of particular groups when determining how curriculum should be modified. In addition, to adopt the modification practices benefiting all students, such as student-centered and individual-focused practices, teachers need to apply their knowledge of specific linguistic and cultural needs of ELLs. It is important for teachers not to stereotype the needs of a specific group; however, it is also crucial for teachers to learn that curriculum modification does not meet with success without special attention paid to unique needs of students: language proficiency and cultural background in the case of ELL students.

### **Modification for Gifted and Talented Students**

We found three empirical studies (Olenchak, 1990; Olenchak & Renzulli, 1989; Reis, Westberg, Kulikowich & Purcell, 1998) and a conceptual study (Johnson, 2000) which focused on the effectiveness of curriculum modification designed as a part of a school-wide program for students identified as gifted and talented—the Schoolwide Enrichment Model (SEM). Johnson (2000) described the concept of SEM in his conceptual study. According to Johnson, the SEM has three components: (a) organizational components which include a schoolwide enrichment team of teachers and parents; (b) structural components which include the regular curriculum, enrichment clusters, and a continuum of special services; and (c) instructional components which include the delivery of enriched instruction and teacher trainings. Curriculum modification with respect to these components focuses on students' strengths and interests and includes teacher-directed modification of specific knowledge, methodology, and application in the prescribed curriculum. The components to be modified include instructional objectives and strategies, content, processes, products, and affect.

Johnson introduced two techniques of curriculum modification: (a) curriculum compacting, which is “the elimination of content that a student has previously mastered or to streamlining content so that it commensurates with a student's level of motivation and ability” (p. 52) and (b) integrated instructional themes which is a cross-subject, thematic integration of curriculum based on students' interests in their total talent portfolios. The underlying ideas of curriculum modification in the SEM is that effective curriculum emphasizes both content and process, develops inquiry, and establishes the interconnectedness of knowledge and skills.

We found three studies which examined the empirical validity of the SEM (Olenchak, 1990; Olenchak, et al., 1989; Reis, et al., 1998). First, Olenchak, et al. (1989) found that a year-long application of SEM to 1,698 elementary school students (K–6) was effective in creating positive changes in student and teacher attitudes toward overall learning and the concept of gifted education. In this study, the researchers used a series of qualitative research methods to investigate the change in the following areas: students' creativity; the students', principals', teachers', and parents' attitudes toward learning; the evidence of school-wide change that resulted from the SEM.

Qualitative methods included interviews, observations, logs, and analyses of students' products. Curriculum compacting following the basic principles described by Johnson (2000) was employed in the SEM process. The authors reported that students' creative productivity increased and that there were significantly positive changes in attitudes towards overall learning and gifted education among the participants. Thus, the authors demonstrated the effectiveness of the SEM for not only gifted and talented students but for other students in a school-wide SEM implementation. This study also contributed to the notion that the concept of curriculum compacting in gifted education needs to be widely acknowledged as a benefit to diverse students as well. After experiencing the SEM, one of the principals in this study commented, "having much more impact on the school than ever before because kids, regardless of scores and grades, can possibly achieve high-quality work in an area they love" (p. 43).

Similarly, Olenchak (1990) reported that curriculum modification provided in the SEM positively affected attitudes toward learning in a study with 1,935 middle school students. In this two-year longitudinal study, Olenchak implemented a mixed research method to investigate the extent students' attitudes towards learning processes varied when he compared different affective variables such as grade level, classroom teachers, learning climate, instructional styles, enrollment in the SEM program, as well as what aspects of SEM students perceived most positively and the differences between SEM and other school programs.

A qualitative regression analysis was used to investigate students' attitudes and the relations between their attitudes and other variables, while a qualitative analysis revealed students' perceptions of SEM. Over all, the authors reported results in which all students developed more positive attitudes towards learning through being enrolled in the SEM and that the students found clear differences between SEM and regular school programs in a way that they were able to engage in more teacher-supported school activities and to pursue self-selected interest-based studies. Thus, the authors raised questions regarding the limited views on gifted education, such as the idea that gifted education is only for the specific group of talented students, and also revealed that SEM would benefit all students while gifted and talented students continue to achieve their goals in general education classrooms.

Another empirical study showed the effectiveness of curriculum compacting on the achievement test scores of gifted and talented students (Reis, et al., 1998). The difference between this study and the other two empirical studies described above is in its specific focus on curriculum compacting. While the other two studies described the effectiveness of curriculum modification implemented as a part of a large program (the SEM), the researchers in this third study investigated issues regarding curriculum

compacting itself, such as the differences in academic achievement of students who received curriculum compacting compared to that of students who did not.

The subjects of this study involved 336 gifted and talented students in grades 2 to 6 from various school settings, including rural, suburban, and urban settings. Curriculum compacting in this study involved eliminating 40% to 50% of already-learned curricula for these gifted and talented students. The Iowa Test of Basic Skills (ITBS) was administered to students in each grade level and the same assessment at one grade level higher was used to assess students' academic achievement in language arts and mathematics. Reis, et al. (1998) found that compacting curriculum did not have negative effect on students' academic achievement as the results showed that there were no significant differences in academic achievement between the students who received curriculum compacting and those who did not. In other words, the students who received curriculum compacting performed as well as the students who received standard curriculum on achievement tests. Although the findings of this study did not determine the long-term effects of curriculum compacting on students' learning achievement, they did contribute to reducing teachers' fears about negative impact of eliminating content from existing curriculum.

All of these studies found the effectiveness of curriculum modification represented as curriculum compacting. Two of three studies (Olenchak, 1990; Olenchak, et al., 1989) were large-scaled longitudinal investigations and all studies focused on investigations at a school-wide level. There are some significant contributions that these studies can offer to our understanding of effective curriculum modifications. First, considering the fact that more studies regarding curriculum modification have been conducted in smaller-scale studies, such as case studies and class-wide investigations, this area of study focusing on gifted and talented students and the SEM contribute significantly to the field by presenting the empirical evidence collected from large samples and school-wide settings. Second, when we understand the SEM as an application of gifted education to the general education classroom, these studies provide the rationales to go beyond the limited perception of gifted education and implement the SEM for all students. The findings of these studies expand the potentialities of an educational practice which was originally designed for a specific group of students. The limitation found in these studies includes their categorization of students. Besides gifted and talented students, the researchers tend to categorize other students as simply others in a control group. Further research is needed to investigate the effectiveness of SEM and curriculum compacting through focusing on specific groups or individual students with unique needs.

The empirical studies reviewed in the following sections demonstrated the effectiveness of curriculum modification on learning achievement and perceptions of students with diverse linguistic, cultural, ethnic, academic skills, and socio-economic backgrounds. In contrast to the fact that many teachers are practicing curriculum modification formally and informally in their everyday classroom teachings, a small number of empirical studies provide evidence for the effectiveness of it. More empirical studies are needed that examine the effectiveness of curriculum modification in a wider variety of educational settings with a wide range of students (e.g., grade, ability, culture, and ethnicity).

## **Modifications Designed for Behavioral Issues**

Five of 15 studies demonstrated effectiveness in students' behavior management (Clarke, Dunlap, Foster-Johnson, Childs, Wilson, White, & Vera, 1995; Dunlap, Foster-Johnson, Clarke, Kern, & Childs, 1995; Dunlap, Kern-Dunlap, Clarke, & Robbins, 1991; Kern, Bambara, & Fogt, 2002; Kern, Childs, Dunlap, Clarke, & Falk, 1994). In this area of study, a group of researchers have conducted a series of studies to replicate and extend research methods and findings. The common focus of curriculum modification in these studies is incorporating students' interests and choice into curriculum.

Researchers conducting four empirical studies (Clarke, et al., 1995; Dunlap, et al., 1995; Dunlap, et al., 1991; Kern, et al., 1994) reported that modified curriculum which incorporated students' personal interests was effective in managing student behavior. In addition to employing effective curriculum modification in these studies they also used pre-intervention assessments of functional analysis and functional assessment to determine what the students' special needs and interests were to most effectively modify learning outcomes for the students. Based on the analyses, the researchers set up situations in which the students were expected to demonstrate more appropriate behaviors. Classroom teachers, then, implemented modified activities, assignments, instructions, and content in their classrooms. For example, in the study conducted by Clarke, et al. (1995), the focus was on the disruptive behaviors of a participant during a handwriting assignment which required the student to copy pages from a traditional handwriting book. A comprehensive process of functional assessment was conducted to investigate problem behaviors and the student's interests through observations, interviews with teachers and the student, and direct discussions with the student. As a result, the authors identified playing Nintendo games as the student's preferred leisure activity and substituted a handwriting activity requiring him to copy rules from a Nintendo game booklet for the conventional handwriting assignment. As we can see in this process, a functional analysis and a functional assessment have their advantages in that all information is from actual individual students and their lives inside and outside classrooms.

In the four studies reviewed in the following section, functional analysis and functional assessment were used repeatedly. Outcomes from the functional analysis and functional assessment became the foundations of teachers' decisions on designing curriculum modification. In each of these studies, the authors reported that considering student's personal interests played a pivotal role when designing curriculum modification and simultaneously emphasized that practicing a functional analysis and a functional assessment were effective tools for identifying student interests and designing curriculum modifications. The following paragraphs describe research findings from each of these four studies which used a functional analysis and a functional assessment.

First, Dunlap, et al. (1991), found that the behaviors of a student with severe emotional disturbance and multiple disabilities improved when teachers implemented a modified curriculum based on the results from a functional assessment of the participant's behaviors, preferred physical movement, and choices. This case study involved a

twelve-year-old female student, Jill, with severe emotional disturbance and a range of disabilities including mental retardation and ADD. Based on a detailed and comprehensive functional assessment of five weeks' duration, the researchers and Jill's teachers hypothesized some of the optimal conditions in which Jill might demonstrate more appropriate behaviors. These conditions were—

- learning through more large motor activities and less fine motor and academic requirements,
- engaging in the activities resulting in concrete and preferred outcomes, and
- having some choice regarding those activities.

In short, the researchers hypothesized that if the curriculum was based on Jill's interests and if it created concrete outcomes she valued her behavior would improve. Curriculum was revised and modified based on the guideline reflecting the hypotheses and was implemented during both academic and non-academic activities for a six-month period. The authors reported that, during the intervention period with the modified curriculum, Jill's disruptive behavior and inappropriate vocalizations decreased and on-task behavior and appropriate social interactions increased. The researchers concluded that functional assessment processes and curriculum modification were found to be efficient to reduce Jill's severe behavior problems.

Second, Dunlap, et al. (1995), also found that modified curriculum based on the results from individual functional assessment helped students with severe emotional behavioral challenges improve their behaviors, productivity, and task-completion. This short-term case study involved three students aged between 9 and 13 who had severe emotional and behavioral challenges. The researchers and teachers identified the students' interests and determined functional/concrete outcomes through individual functional assessment, including interview, observation, and brief probe. They then designed modified tasks and instructions based on the functional/concrete outcomes reflecting students' interests. For instance, the functional assessment revealed that one of the participants, Jerry, enjoyed sharing snacks with others, and the researchers determined that the functional outcome was an assembly task reflecting his interests. The modified task derived from this functional outcome was for him to engage in a multi-step assembling process of preparing cracker sandwiches with peanut butter and jelly for himself and his classmates. This modified task substituted for Jerry's previous task of assembling pens.

Overall, the researchers reported results that each student engaged in less problem behavior when they received modified curriculum. Productivity and the rate of task completion increased as well as the students' affect which showed a positive change after the intervention. Dunlap, et al. (1995), concluded that tasks and activities can be modified through providing different variables, such as materials, response requirements, outcomes, and familiarity. They also emphasized that these variables in students' social contexts and the combinations of such variables play a key role in the process of an effective curriculum modification.

In the third study found, the authors reported similar results to Dunlap, et al. (1991), and Dunlap, et al. (1995). Clarke, et al. (1995), found that curriculum modified to incorporate students' interests were associated with reductions in inappropriate behaviors and an increase in task productivity. Importantly, the researchers used a functional assessment

to determine the students' interests and modified tasks. Their study involved four boys with severe emotional and behavioral disturbance and other disabilities (such as autism and ADHD). The data were collected over a five-week period in the students' specialized classrooms. Based on the results from functional assessment, the researchers provided the students with both standard assignments and assignments incorporating students' personal interests.

There were three dependent variables identified when measuring the effects of modified curriculum: (a) disruptive versus desirable behavior, (b) student productivity, and (c) social validity. The researchers collected student behaviors data through classroom observation and audio and video recording using a 15-second partial interval system. For students' productivity, the researchers investigated the rate of performance and the amount of task completion within the scheduled session. Questionnaires were used to examine the social validity of modified curriculum and were completed by teachers and students. Clark and colleagues report that modifying curriculum through using functional assessment and incorporating students' interests was effective in reducing students' disruptive behaviors and in promoting task productivity. The questionnaire results also indicated that there was a consistent positive difference among the subjects for the assignment created based on student interests in comparison to the conventional assignment.

The fourth study which used functional assessment was a case study conducted by Kern and his colleagues (1994). The researchers found that functional assessment of a student's behavior, the hypotheses developed through the assessment, and the guideline for curriculum modification reflecting the hypotheses contributed to the effective practice of modified instructions and assignments in English, math, and spelling classes for a student with emotional and behavioral challenges. The student's on-task behavior increased when modified curriculum took place. In this case study, the participant was an 11-year-old boy, Eddie, with emotional and behavioral challenges and, unique to this study, with above average cognitive and communication skills. After a comprehensive functional assessment, five curricular variables were identified and hypotheses were developed according to the functional assessments. The researchers hypothesized that Eddie's *on-task behavior increases* (a) when engaged in activities that do not require excessive amounts of handwriting, problem-solving skills, multiple brief tasks, as well as (b) when he is reminded to attend to his work, and (c) when provided with the option of working in a study carrel. Based on these hypotheses, the researchers modified curriculum used in Eddie's English, math, and spelling classes. Curriculum modification included the manipulation of "several curricular variables related to the content, length, and mode used to perform tasks" (p. 17, Kern, et al., 1994).

During the 8-week intervention period, Eddie's on-task behavior was recorded and a self-reported activity rating form was used. As a result, Eddie's on-task behavior increased when he received modified curriculum in all academic subjects. In addition, his teacher reported substantial improvements in work completion. Also, Eddie preferred the revised curriculum to standard curriculum. Kern, et al. (1994), emphasized that increased individualization, such as incorporating students' interests in curriculum, contributes to not only the intended goals for an individual student but potentially to

other educational goals as well. In Eddie's case, teachers can expect that the reduction of undesirable behaviors resulted from curriculum modification would positively influence his academic progress.

Similar results to the four studies described above were reported by Kern, et al. (2002), without a formal use of functional analysis/assessment. Their study reported that modifying curriculum through incorporating students' interests into instruction increased the engagement of students with severe emotional disturbance and decreased their destructive behavior. The subjects of this study were 6-, 13-, and 14-year-old boys. All participants attended a university-affiliated private school for students with severe behavioral challenges.

The purpose of this study was to examine the effectiveness of modified curriculum which provided choice-making opportunities and high-interest activities simultaneously across all students in the class. The modified science curriculum included choice-making (both individual and group choices) and high-interest activities. For instance, students were allowed to choose one of two different activities, such as an experiment checking air pollution or one about the beginnings of land pollution. High-interest activities were determined by teachers' previous teaching experiences with the students and informal assessments. The researchers recorded the change in student behaviors in two phases, a baseline phase with traditional science curriculum and an intervention phase with the modified science curriculum. Students' engagement and classroom behaviors were measured. In addition, the researchers examined students' opinions about curriculum modification by having students complete class evaluation sheets.

Kern, et al. (2002), reported that student engagement increased and destructive behavior decreased when they received the modified science curriculum. Also, the ratings of student preference for the lessons employing curricular modifications were slightly higher than baseline condition. The classroom teachers reported overall satisfaction with all aspects of the intervention. The significance of this study includes results suggesting curriculum modification at the classroom level resulted in equally positive outcomes as the previous studies at the individual level.

Thus, results of these studies indicate that, with formal or informal assessment of students' interests and behavioral issues, curriculum modification created flexibility through which teachers were able to create more appropriate learning contexts for their students with emotional and behavioral challenges. The flexibilities in the modified curriculum evident in these studies incorporated student interests and providing choices. These modifications were found to be effective to improve behavioral issues for students with various types of disabilities and cognitive challenges.

One of the limitations of these studies was research design. These studies took place in special programs designed specifically for students with emotional and behavioral challenges, and there were no control groups with which to compare results. Therefore, the generalizability of the results to other educational settings, such as integrated classrooms, is less clear. However, there is also *strength* in their research design.

Significantly, the researchers in these studies obtained data not in controlled laboratory settings but in actual classrooms with the participants' teachers. In all studies, teachers implemented modified activities, assignments, instructions, and content. Of significance

as well is that the student interests did not necessarily have to come from school-oriented topics but could come from outside school. Overall, these studies contributed to our understanding of the effectiveness of curriculum modification to students' behavior management. There seems to be a strong research trend to replicate and expand currently available research results to further research efforts with different groups of students and different scales of study. Future research in this field is expected to continue following this trend.

### **Modifications Designed for Inclusion**

In this section we present one descriptive report by Salisbury, Mangino, Petrigala, Rainforth, Syryca and Palombaro (1994) with empirical evidence regarding the effectiveness of curriculum modification for inclusion (Salisbury, et al., 1994). Salisbury and her colleagues found that modifying curriculum based on students' IEPs resulted in successful physical, social, and instructional inclusion of students with mild to profound disabilities. This study reported a curriculum adaptation process used for 26 students across kindergarten through grade 4 in a suburban rural, blue collar community in south central New York but contained the results from only 3 students. These students had various types of disabilities, including learning challenges, Hydrocephaly, a V-P shunt, severe mental retardation, and problem behaviors. The researchers investigated how the curriculum modification process could be applied in mathematics, science, and language arts lessons in order to optimize the instructional inclusion of students. Students' physical, social, and instructional inclusion was recorded through staff observation, video, and teacher logs.

In order to design the modified curriculum, combinations of varying levels of content and objective modifications were selected based on the individual student's needs. The researchers suggested that, in the development of adaptation process, teachers need to be aware of the following 4 ideas: (a) the students' unique differences should be valued, (b) not all students need to be doing the same thing at the same time, (c) team members or teachers contribute uniquely to the planning and implementation of the process, and (d) all students should belong in the age-appropriate general education class. They also asserted that, for successful curriculum modification, team members need to understand students' IEPs, plan in advance, expand their knowledge of curriculum, and collaborate with one other.

### **Self-Determination Training to Enhance Modification**

Teaching students with disabilities the skills associated with self determination may enhance the affordance of curriculum modifications and improve access and progress in the general education curriculum. Two studies investigated the effects of teaching students self-determined behaviors such as goal setting, self-regulation, and problem solving on access to the general education curriculum. Lee, Wehmeyer, Palmer, Soukup, and Little (2008) recruited 45 high school students with disabilities from 11 schools for the study. Participants in the intervention group received training to promote self-determined behaviors while participants in the control group didn't. Results of the study showed that students who received the Self-Determined Learning Model of Instruction (SDLMI) achieved goals linked to the general education curriculum at a

higher rate, increased in engagement behaviors, and decreased in competing behaviors (e.g., behaviors that disrupt student engagement). Shogren, Palmer, Wehmeyer, Williams-Diehm and Little's (2012) study expanded on previous research regarding the impact of SDLMI on goal attainment and access to the general education curriculum. The study included 312 high school students with disabilities from three states and 20 school districts. Participants who received SDLMI instruction showed a significant increase in measurements of self-determination, goal attainment, and access to the general education curriculum. Together, the results suggest that self-determination instruction can improve students' self-determination skills and access to the general education curriculum.

## **Summary**

There are a small number of empirical articles available investigating the effectiveness of curriculum modification on students' inclusion. One of the possible reasons is that many researchers discuss curriculum modification as a part of inclusion strategies. Also, many studies do not clearly identify curriculum modification as a strategy for inclusion and therefore were not reviewed for this paper.

The research studies reviewed in this section, Evidence of Effectiveness, showed the potentialities of curriculum modification for various groups of students and teachers. With its flexibilities, curriculum modification seems to be effective in countless ways. Therefore, stating all possible effective areas is beyond the scope of this report. The similarity found among these studies was their emphases on the constructive view of curriculum design with a student-centered approach. All studies suggested that the process of an effective modification requires the deep analysis and assessment of students' needs and their learning contexts. Students' needs play essential roles in the process of modification. Clear evidence was seen in the approach of functional analysis/assessment. These studies also suggested that important elements for curriculum modification, such as personal interests, may be commonly considered for all students, whereas others may be specific to certain groups, such as linguistic and cultural integration for ELLs. The affordance of curriculum modification can be greatly enhanced if students are supported to develop the the knowledge and skills of self-determined learners.

Most importantly, the findings of these studies reported the effectiveness of curriculum modification for various groups of students, including general education students, ELLs, gifted and talented students, and students with a variety of disabilities. These findings suggested the potentialities of curriculum modification for all students. In order for teachers to learn more about the empirical evidence of curriculum modification in educational settings similar to their own, further research is needed with a wider range of educational contexts.

## **Factors Influencing Effectiveness**

This section describes four factors influencing the effectiveness of curriculum modification: (a) individual needs, (b) subject-specific needs, (c) teachers' roles and school support, and (d) use of technology.

## **Individual Needs**

When teachers modify curriculum, they first need to analyze and assess educational contexts and to determine the method of modification based on individual student needs. In other words, the impetus of curriculum modification derives from individual needs identified in actual educational settings. Although the extent of curriculum modification widens from accommodation to overlapping curricula, this extent does not represent the degree of effectiveness. Some students may benefit from a minor modification rather than from major changes regardless of student levels of disability or needs. Also, applying curriculum modification for all students may actually have a negative impact on the students who do not need it.

King-Sears (2001) suggested, for example, that teachers can practice curriculum modification when curriculum enhancement alone is not effective. This, however, does not mean that curriculum modification is closer to ideal for those who need greater supports to access general curriculum. Curriculum enhancement may work better in some situations than curriculum modification and vice versa. It is crucial to determine the most appropriate method for approaching general curriculum based on our understandings of students' unique needs and educational contexts. King-Sears stated that for those students who need further modifications, "the design and delivery of [modifications] should be done in a manner that is thoughtful and considerate of individual student needs" (p. 11).

Both formal and informal analysis and assessment of individual needs are useful for teachers to design effective curriculum modification. Learning about specific needs of particular groups of children, in addition to identifying individual needs in actual classroom settings, may also be a good starting point for teachers to plan curriculum modification.

## **Subject-Specific Needs**

Other contextual variables, such as the subject of learning, play important roles when determining modified goals for students. For instance, Cawley and Parmar (1990) suggest that, in the field of mathematics, curriculum modification which benefits students with disabilities cannot "simply consist of reduction in the quantity of information or the rate of presentation" (p. 518). Instead, they assert that curriculum modification should include curriculum reorganization, which focuses on the conceptual content and individual relevance of the curriculum including "mathematical reasoning, understanding, and the ability to apply computation in real-life situations" (p. 518-19, Cawley & Pamar, 1990). Thus, the goals of modified curriculum are influenced not only by a particular student's unique needs but also by the particular way of knowledge-building associated with content area.

## **Teachers' Roles and School Support**

Teacher involvement may play a key role for successful curriculum modification. Comfort (1990) acknowledged that practicing curriculum modification is a professional task and asserts that teachers should be encouraged to take part in curriculum and instructional decision-making regardless of the pressures of the standardized testing movement built around curriculum standards. Comfort suggests four factors that foster curriculum modification: (a) a school system curriculum of appropriate breadth and

specificity, (b) curriculum development and implementation processes that include an integral role for teachers, (c) an expectation of greater collaborative relationship, and (d) the provision of orientations to and encouragement of the practice of curriculum modification.

In order to meet these factors, teachers need an extensive amount of support at the school level, including teacher training and professional development opportunities.

MacMackin, et al. (1997), point out that many general and special education teachers are interested in meeting the diverse needs of students but do not know how to make appropriate modifications.

In reality, many teachers tend to make inconsistent and unsystematic use of curriculum modification due to lack of training and their doubts of ineffectiveness. Some teachers first tend to express doubts about students' reactions to the modified units but are usually surprised at the positive outcomes (Tieso, 2001). Further efforts are necessary to promote more school-wide support and demonstrate empirical evidence of effective curriculum modification.

## **Use of Technology**

Technology contributes to the effectiveness of curriculum modification when used appropriately (Birnbaum, 2001). Birnbaum suggests that the selection and the practice of technology, such as software, computer games, the Internet, multimedia, and hypermedia, need to follow the student's IEP in relation to the general curriculum.

Based on the individual student's needs, teachers can select technologies with features promoting active learning, experimentation, controlled interactions, and independence. For instance, use of a computer game (such as Jumble by the Tribune Company) may be appropriate for ELLs or students with reading difficulties since it can provide an opportunity to learn and enforce vocabulary. Thus, when modifying curriculum with technologies, teachers need to remember that the features of those technologies have to match individual students' needs.

Teachers also need to recognize that computer experience may vary greatly among students. Teachers need to consider what Bray, et al. (2004), called digital divide—"the gap between those in society who have access to computer technology and those who do not" (p. 3). Again, obtaining information about individual students is a key to successfully incorporating technology use into curriculum modification.

Overall, the four factors discussed above reflect how successfully teachers utilize their knowledge of individual students, educational contexts, and how effectively teachers and students select and use available resources to meet students' unique needs. As we see in Comfort's statement, "curriculum modification is firmly grounded in the practical realities of the classroom" (1990, p. 398), the effectiveness of curriculum modification is deeply influenced by many factors existing in actual classrooms.

## **Applications to General Education Classroom Settings**

Curriculum modification consists of potential benefits for not only the students who need special support but also other students who learn in the same learning environment at

any age level. For instance, general education students may benefit from modified curriculum designed for students with behavioral problems in general classroom settings. Through the increased positive behavior and learning productivity of those students, other students in the same classroom may experience a more optimal learning environment and opportunities for mutual understanding and more interactions. In another situation, integrating students' linguistic and cultural needs may provide other students with the opportunity to learn a new language and culture and may increase their multicultural awareness and mutual respect. In short, when a particular group of individual students in a classroom benefit from curriculum modification, there is a great possibility that other students receive benefits as well. The mutual benefit can be planned as a shared goal as in the process of overlapping curricula, or such shared learning can naturally occur in our everyday teaching.

It is important for teachers to know that various factors affect the effectiveness of curriculum modification. A teacher's understanding of students' backgrounds, resources and materials, and school support are some of the important factors to consider. Professional development opportunities are especially necessary in order for teachers to improve their skills and knowledge in curriculum modification.

In actual classrooms, modifying curriculum may require teachers to use their creativity and flexibility. For instance, they may need to form small groups for some students during a lesson or practice differentiated instruction as needed. (For more information, see the literature review of [Differentiated Instruction](#) on the AEM Center web site).

Teachers may also need realistic numbers of adults working in their classrooms and vitality to make extra efforts to modify existing curriculum. Switlick (1997) suggested that curriculum modifications become successful when including FLOW: **F**it into the classroom environment, **L**end themselves to meeting individual student needs, **O**ptimize understanding for each student, and **W**orks well with the activity planned for the lesson. Curriculum modification can be applied to general classrooms in multiple ways in order to enhance learning potentialities for all students. Only when contextual factors and principles of successful modification are taken into consideration, and the modification is well designed to fulfill individual students' needs determined through extensive analyses and assessment, does curriculum modification play a vital role to move students forward in their learning.

## **Links to Learn More about Curriculum Modification**

### [Curriculum for Learning Disabled Students: More Than Just Textbooks and Workbooks](#)

The National Challenged Homeschoolers Association Network (NATHAN) supports this web site and this article was written by Dr. John Sutton. The article includes a traditional and modern definition of curriculum and argues that commercially produced educational products may not be appropriate for students with learning disabilities. Dr. Sutton provides many suggestions for how to approach selecting educational materials for

home-schooled children and how to go about employing these materials to teach students with learning disabilities in a home school curriculum.

### [Curriculum Modifications](#)

This link provides access to a wealth of information on working with students who are considered “special needs” because they are gifted. The links within this site provide information on the needs of gifted students and how they differ from other children in the classroom as well as suggestions for accommodating these students. Some links provide specific information and others provide the user with source information on a particular topic while additional links provide access to research on the topic. The home site is copyrighted by “Carolyn K,” and the site is called Hoagies’ Gifted Education Page.

### [Key Attributes of Curriculum Modification](#)

This site provides an “at a glance” reference guide of information on the SAGE Program of the Framingham, MA public schools. It is a resource for educators working with students with special needs of giftedness.

### [Modifying the Elementary Curriculum for Students of Special Needs: A List of Ideas](#)

This web page was written by Jan Demontigny from Farm Hill Elementary School in Middletown, CT. The article is a bullet point list of various curriculum modifications that Mrs. Demontigny has employed in her general education classroom to help students with disabilities. The list includes nine suggestions and an explanation for why they each assist students with disabilities in the general education classroom (article begins approximately 1/3 down the page).

### [Students With Intellectual Disabilities: A Resource Guide for Teachers](#)

Developed by the Ministry of Education of British Columbia, Canada, this web site is an information resource. The ministry is dedicated to providing a high-quality education for children in Kindergarten to Grade 12 so they can develop their individual potential and acquire knowledge, skills, and attitudes to contribute to society. This informational piece focuses on curriculum modification and provides six examples of curriculum modifications that teachers may want to employ in their classroom. Additionally, it provides answers to a multitude of questions related to the IEP process and how to transform broad goals into objectives. This is one of several informational articles provided on this web site for teachers and parents.

### [The ABC’s of Curriculum Adaptation](#)

Brookes Publishing maintains this site and allows limited free access to newsletters and other publications put out by their company. This link brings you to an easy-to-read newsletter entitled “The ABC’s of Curriculum Adaptation.” Suggestions for what needs to be done when planning and implementing an adapted curriculum are clearly outlined. The page provides links to information on other publications by this company.

### [Bridges4Kids](#)

Bridges4Kids supplies support, information, networking, and advocacy training for parents of children with special needs.

### [“What Are Teachers Doing to Accommodate for Special Needs Students in the Classroom?”](#)

This article from the *Electronic Journal for Inclusive Education* was written by Brenda

Stevens, Caroline Everington, and Stacy Kozar-Kocsis. The authors sought to research these questions: (a) if type of disability a student may have affects the frequency of curricular modifications made for the individual, (b) if special education and typical students receive the same amount of curricular modifications, and (c) if there is a relationship between modifications made for special needs students and for average students. This article outlines what the authors did and their findings on these topics.

## References

Birnbaum, B. W. (2001). Using computers to modify the curriculum for students with learning disabilities. *Learning Disabilities: A Multidisciplinary Journal*, 11(1), 19-25.

Birnbaum provides practical ways to modify curriculum using technology. The author identifies five areas to consider when teachers incorporate technology into curriculum for students with learning disabilities: (a) criteria for the selection of software, (b) using computer games, (c) the Internet as a tool for teaching across the curriculum, (d) using multimedia, and (e) using hypermedia. A list of web sites useful across subjects is provided for teachers.

Bray, M., Brown, A., & Green, T. D. (2004). *Technology and the diverse learner: A guide to classroom practice*. Thousand Oaks, CA: Corwin Press, Inc.

This book is designed for those who are teaching diverse learners and who want to incorporate technology into instruction. The diverse students on whom this text is focused include female and male students, students with different cultural backgrounds, English second language learners, students with disabilities, and gifted and talented students. The authors provide practical ideas of technology solutions for each group of diverse students as well as overviews of each group's characteristics. The appendices at the end of this book include useful resources of which particular technology and instructional strategies are suitable for a particular group of students.

Buxton, C. (1999). Designing a model-based methodology for science instruction: Lessons from a bilingual classroom. *Bilingual Research Journal*, 23(2&3), 113-143.

The authors of this article present empirical findings from a three-year longitudinal science project, the Science Theatre Project, in which modified science curriculum was provided to elementary aged Spanish-English bilingual children in a two-way bilingual program. The researcher reported upon the effectiveness of modified science curriculum to students' academic success. Buxton emphasized the consideration of students' cultural backgrounds in the process of modification.

Cawley, J. F. & Parmar, R. S. (1990). Issues in mathematics curriculum for handicapped students. *Academic Therapy*, 25(4), 507-521.

Cawley and Parmar explain the curriculum modification procedure in mathematics necessary for students with handicaps. The authors describe that curriculum modification in mathematics has to include curriculum reorganization, which focuses on the concepts relevant to a specific subject rather than simply on material and the amount of information provided. Theoretical backgrounds and examples of curriculum reorganization are presented within the framework of the National Council of Teachers of Mathematics (NCTM) standards.

Clarke, S., Dunlap, G., Foster-Johnson, L., Childs, K., Wilson, D., White, R., & Vera, A. (1995). Improving the conduct of students with behavioral disorders by incorporating student interests into curricular activities. *Behavioral Disorders*, 20(4), 221-237.

In this empirical study the authors suggest that curriculum modified with students' personal interests was effective in improving their behavior management and increased their task productivity. Functional analysis and functional assessment were used to determine students' interests. Qualitative data obtained via a questionnaire demonstrated that students preferred the modified curriculum to the conventional curriculum.

Comfort, R. (1990). On the idea of curriculum modification by teachers. *Academic Therapy*, 25(4), 397-405.

Comfort presents a theoretical perspective of curriculum as a teacher-directed modification process and provides suggestions for teachers in terms of their professional responsibilities. Comfort also provides four elements conducive to fostering curriculum modification: (a) a school system curriculum of appropriate breadth and specificity, (b) curriculum development and implementation processes that include an integral role for teachers, (c) expectations for greater collaborative relationships, and (d) provision of orientations to and encouragement of the practice of curriculum modification.

Cosier, M., Causton-Theoharis, J., & Theoharis, G. (2013). Does access matter? Time in general education and achievement for students with disabilities. *Remedial and Special Education, 34*(6), 323-332.

Cummins, J. (2000). *Language proficiency in academic contexts: Language, Power, and Pedagogy: Bilingual Children in the Crossfire* (pp. 57-85). Toronto, Canada: Multilingual Matters LTD.

Cummins provides a rationale for the distinction between the acquisition of conversational language and that of academic language from multidisciplinary points of view in the chapter cited. The author describes the distinction using the framework in which students' language proficiency is categorized by the fundamental dimensions of contextual support and cognitive demand. This framework highlights the way in which educational interventions for ELL students relate to various factors, such as students' language and culture, societal power structure, instruction, and assessment.

Dunlap, G., Foster-Johnson, L., Clarke, S., Kern, L., & Childs, K. (1995). Modifying activities to produce functional outcomes: Effects on the problem behaviors of students with disabilities. *Journal of the Association for Persons with Severe Handicaps, 20*(4), 248-258.

Dunlap, et al., in this empirical study suggest that modified curriculum was effective in reducing students' disruptive behaviors and increasing their task productivity and completion. Curriculum was modified with students' personal interests determined through a functional assessment.

Dunlap, G., Kern-Dunlap, L., Clarke, S., & Robbins, F. R. (1991). Functional assessment, curricular revision, and severe behavior problems. *Journal of Applied Behavior Analysis, 24*, 287-397.

In this case study, functional assessment was used to determine students' behaviors, preferred physical movement, and choices and curriculum was modified according to the findings of the assessment. Dunlap, et al., report findings that functional assessment processes and curriculum modification were effective in reducing students' severe behavior problems.

Fradd, S. H., Lee, O., Sutman, F. X., & Saxton, M. K. (2001). Promoting science literacy with English language learners through instructional materials: A case study. *Bilingual Research Journal, 25*(4), 417-439.

Fradd, et al., report upon the effectiveness of curriculum modification as implemented in two large-scale science projects: the Promise Project and the Science for All Project. Curriculum modification included the incorporation of more open inquiry and the integration of language and literacy aspects into curriculum for English Language Learners. The researchers concluded that modified curriculum was effective in increasing the students' academic achievement in science.

Hehir, T., Schifter, L., Grindal, L., Ng, M., & Eidelman, H. (2014). *Review of special education in the commonwealth of Massachusetts: A synthesis report*. Boston, MA: Massachusetts Department of Elementary and Secondary Education.

Igoa, C. (1995). *The Inner World of the Immigrant Child*. New York, NY: St. Martin's Press, Inc.

This book describes immigrant children's psychosocial experiences in schools. Igoa uses qualitative research methods and provides rich narratives expressed in children's voices in order to illuminate the issues of being immigrant children in this country. As a teacher who was involved in this participatory

action research, Igoa presents three major suggestions to the educators of immigrant children: (a) step-by-step teaching methodologies sensitive to immigrant children's needs and feelings, (b) specific classroom practices that contribute to children's literacy development and their self-empowerment, and (c) program designs for more personalized teaching.

Johnson, G. M. (2000). Schoolwide enrichment: Improving the education of students (at risk) at promise. *Teacher Educator*, 27(4), 45-61.

Johnson presents theoretical and practical aspects underlying the Schoolwide Enrichment Model (SEM). The main point of this article is that the SEM can benefit not only gifted and talented students but also students who are identified as at-risk. The process of curriculum modification techniques, as well as curriculum compacting, is explained as a part of the SEM.

Kern, L., Bambara, L., & Fogt, J. (2002). Class-wide curricular modification to improve the behavior of students with emotional or behavioral disorders. *Behavioral Disorders*, 27(4), 317-326.

Kern, et al., examined the effectiveness of modified curriculum for six teenage boys with behavioral challenges. Curriculum modification in this study involved more choice-making opportunities and high-interest activities. The authors reported that modified curriculum contributed to the reduction of students' disruptive behaviors and increased engagement in their academic tasks.

Kern, L., Childs, K. E., Dunlap, G., Clarke, S., & Falk, G. D. (1994). Using assessment-based curricular intervention to improve the classroom behavior of a student with emotional and behavioral challenges. *Journal of Applied Behavior Analysis*, 27, 7-19.

The authors of this case study reported that modified curriculum in English, math, and spelling was an effective way to increase on-task behavior of a child with severe emotional and behavioral challenges. Kern, et al., used functional assessment to examine the student's behavior and to develop hypotheses for modifying curriculum based on the student's unique needs. Curriculum modification in this study included change to the content, length, and mode of performance in instruction. This study contributes to the justification of incorporating a functional assessment into a curriculum modification process for children with behavioral issues.

King-Sears, M. E. (2001). Three steps for gaining access to the general education curriculum for learners with disabilities. *Intervention in School and Clinic*, 37(2), 67-76.

King-Sears presents a three-step process for teachers to determine the degree of accessibility of their classroom for their students with disabilities and introduces checklists, examples, and rubrics, and suggestions for strengthening and modifying the curriculum. King-Sears categorizes curriculum modification into four main topics: accommodation, adaptation, parallel curriculum, and overlapping curricula. The three-step process includes (a) analyzing the general education curriculum, (b) curriculum enhancement, and (c) curriculum modification. The author's emphases are on the importance of teacher collaboration and individually designed curriculum modification. King-Sears' view contributes to the notion that curriculum enhancement and curriculum modification can be effective for all students.

Lee, S. H., Wehmeyer, M. L., Palmer, S. B., Soukup, J. H., & Little, T. D. (2008). Self-determination and access to the general education curriculum. *Journal of Special Education*, 42, 91-107.

MacMackin, M. C. & Elaine, M. B. (1997). A change in focus: Teaching diverse learners within an inclusive elementary school classroom. *Equity & Excellence in Education*, 30(1), 32-38.

MacMackin and Elaine suggest that modifications of curriculum and those of instruction are both necessary to meet diverse needs of students in inclusive classrooms. This article provides the concepts of curriculum modification for many general education teachers who are interested in meeting the diverse needs of students but do not know how to make appropriate modifications. The authors also describe three categories of curriculum and instructional modification: (a) modifications of the context for learning,

(b) modifications of instructional strategies/instructional materials, and (c) modifications of organizational and study skills.

Moon, T. R. & Callahan, C. M. (2001). Curricular modifications, family outreach, and a mentoring program: Impacts on achievement and gifted identification in high-risk primary students. *Journal for Education of the Gifted*, 24(4), 305-321.

Moon and Callahan report upon the effectiveness of curriculum modification implemented as a part of Project Support to Affirm Rising Talent (START). Modified curriculum, when combined with other interventions in the project, was helpful to prevent academic failure among primary grade students from low-socioeconomic environments, especially those who were identified as at-risk.

Olenchak, F. R. (1990). School change through gifted education: Effects on elementary students' attitudes toward learning. *Journal for Education of the Gifted*, 14(3), 66-78.

In this empirical study by Olenchak the author shows that curriculum modification implemented through the Schoolwide Enrichment Model (SEM) had a positive impact on students' attitudes toward learning. The subjects involved a large population of middle school students. Olenchak emphasizes the effectiveness of the SEM for all students and suggests that our preconceptions of gifted education as a limited educational opportunity for only selected students need to be changed.

Olenchak, F. R. & Renzulli, J. S. (1989). The effectiveness of the schoolwide enrichment model on selected aspects of elementary school change. *Gifted Child Quarterly*, 33(1), 36-46.

The researchers of this empirical study illustrate that a one-year implementation of the Schoolwide Enrichment Model (SEM) was effective for a large number of elementary school students—not only gifted and talented students but also general education students—regarding their creative productivity and attitudes toward overall learning as well as the concept of gifted education. As a part of the model, curriculum compacting was used.

Reis, S. M., Westberg, K. L., Kulikowich, J. M., & Purcell, J. H. (1998). Curriculum compacting and achievement test scores: What does the research say? *Gifted Child Quarterly*, 42(2), 123-129.

The authors of this empirical study examined the effectiveness of curriculum compacting on the achievement test scores of gifted and talented students. Curriculum compacting was used as an enrichment and involved eliminating about half of already-learned curricula. The results reported indicate that students who received compacted curriculum performed as well as those who received regular curriculum without any elimination. The findings of this study can help reduce teachers' fears regarding compacting curriculum for gifted and talented students.

Reisberg, L. (1990). Curriculum evaluation and modification: An effective teaching perspective. *Intervention in School and Clinic*, 26(2), 99-105.

Reisberg presents a format for curriculum evaluation based on the literature on effective teaching for students with disabilities, including the ideas suggested by Englert, Rieth, and Everson and Rosenshine. Reisberg's format includes six domains: (a) scope and sequence, (b) organization, (c) presentation, (d) guided practice, (e) independent practice, and (f) periodic review. Rosenshine posits that the curriculum evaluation should reflect the components of effective teaching, such as the completeness and organization of the curriculum, response requirements, and opportunities and procedures for measurement.

Salisbury, C. L., Mangino, M., Petrigala, M., Rainforth, B., Stryca, S., & Palombaro, M. M. (1994). Promoting the instructional inclusion of young children with disabilities in the primary grades. *Journal of Early Intervention*, 18(3), 311-322.

Salisbury describes how curriculum adaptation successfully promoted physical, social, and instructional inclusion of elementary age students with mild to severe disabilities. Curriculum adaptation involved change to the content and objectives of the curriculum used based on students' IEPs. Four suggestions for successful curriculum adaptation processes for inclusion are recommended by the author.

Shogren, K. A., Palmer, S. B., Wehmeyer, M. L., Williams-Diehm, K., & Little, T. D. (2012). Effect of intervention with the self-determined learning model of instruction on access and goal attainment. *Remedial and Special Education, 33*(5), 320-330.

Sparks, S. (2000). Classroom and curriculum accommodations for Native American students. *Intervention in School and Clinic, 35*(5), 259-263.

Sparks suggests a culture-specific approach to curriculum accommodations for culturally diverse students, especially Native American students, and provides theoretical ideas to practice this approach. Ideas include learning about a student's life, including aspects of specific tribe culture and individual family lives as a part of the curriculum, building the curriculum on positive images of students' culture not on negative stereotypes, using effective ways of communication, developing cultural sensitivity, and learning about the characteristics of Native American learners.

Switlick, D. M. (1997). Curriculum modifications and adaptations. In D. F. Bradley, M. E. King-Sears, & D. M. Switlick (Eds.), *Teaching Students in Inclusive Settings*, (pp. 225-239). Needham Heights, MA: Allyn & Bacon.

The authors of this chapter describe methods to modify the curriculum and daily instructional activities for teachers to meet the diverse needs of students. The types of modification include accommodation, adaptation, parallel instruction, and overlapping instruction. The author recommends teachers make systematic adjustments to curriculum and presents useful tables describing the planning processes, including pre-planning, interactive planning, and post-planning.

Tieso, C. (2001). Curriculum: Broad brushstrokes or paint-by-the numbers? *Teacher Educator, 36*(3), 199-213.

In this qualitative study focusing on general education students Tieso demonstrated that modified math curriculum was positively perceived by a teacher and students. The author interprets the positive perspectives as a necessary element for students' academic achievement.

Valdes, G. (2002). *Expanding Definitions of Giftedness*. Mahwah, NJ: Lawrence Erlbaum Associates.

In this book Valdes describes the way in which immigrant children engage in interpreting tasks for their families. Valdes presents empirical findings suggesting that children who interpret show sophisticated levels of meta-linguistic abilities as well as bilingual proficiency and social maturity. Based on these findings, Valdes challenges the existing definitions of gifted and talented and suggests there is a monolingual-biased view of bilingual children in educational settings.