CHAPTER 23

CONSIDERATIONS IN CURRICULUM FOR GIFTED STUDENTS

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Considerations in designing and developing curriculum for gifted students is a dynamic enterprise, influenced by many factors in the larger environment of education and the field of gifted education itself. Standards debates, ethics infractions, the development of new models, methods, and materials all influence how we view curriculum for gifted students and its essential components. This chapter addresses considerations considered universal and timeless, as well as newer considerations on the basis of contemporary topics. The context is aimed at K–12 educational landscapes, although the ideas have salience for college experiences at the undergraduate level as well. The chapter lays out the considerations for development of a specialized curriculum for gifted students, and the features of designing such curriculum. It concludes with a checklist that may be used for purposes of development and design on the basis of the commentary provided.

KEY CONSIDERATIONS FOR DEVELOPING CURRICULUM FOR GIFTED STUDENTS

Organized experiences for gifted learners at every stage of development matter and require conceptual connections throughout grades K–12. They also require a consistent emphasis on using higher level skills (e.g., critical and creative thinking and problem-solving) that result in applications to worthy products. Because gifted learners consistently learn new material faster and in "chunks, rather than bits," appropriate levels of learning need to be assessed at each stage to ensure challenge. Educators working with gifted students also must be mindful of the new content standards and ensure that curriculum is developed to align with these standards at more advanced levels. Yet, effective curriculum plans for gifted students must also ensure that features of affective, aesthetic, and cognitive development be considered and integrated appropriately. The next section delineates critical areas of consideration for integration within a curriculum plan.

AFFECTIVE CURRICULUM EMPHASES

In recent years, the use of an affective emphasis in curriculum has been studied from an integrated approach, as well as from a separate curricular emphasis, with positive results in both arenas. Beghetto and Kaufman (2009) argued that the infusion of creativity into a gifted curriculum may ensure greater connectivity to affective development. In the more integrated approach, facilitator commitment to the curriculum was a critical variable for success (Eddles-Hirsch, Vialle, Rogers, & McCormick, 2010). In another intervention program, the use of integrated moral and emotional emphases was integrated into a secondary environmental studies program with positive results for student growth and course satisfaction (Hartsell, 2006). Therefore, the teaching of higher level skills can have a positive impact on affective, as well as cognitive, development.

What aspects of an affective curriculum should be considered? Most goal structures in local curriculum would include an emphasis on understanding

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of self and developing social responsibility in various ways. Overall, meta-analytical results from 213 studies, half of which were at a secondary level, suggest an 11-point advantage in achievement for programs that contain a social and emotional emphasis. More specifically, the study found that a set of four strategies moderated program outcomes: the use of a sequenced program, a focus in a specific area, explicitness in a desired outcome, and the use of active learning. The study also found that classroom teachers were as effective in implementation as were specialized personnel (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011).

There are several models that can frame interventions for gifted learners in affective development. The work of Peterson and Seligman (2004) on positive psychology, and the application strategies conceptualized by Niemiec, Rashid, and Spinella (2012), relate to virtues and character traits that provide useful tools for this purpose. The use of an emotional intelligence framework (e.g., Salovey, Bedell, Detweiler, & Mayer, 2000) also may be an important model for deliberately developing self-understanding. The framework begins with one being able to perceive, appraise, and express emotion in a variety of contexts, then moves to using emotions to facilitate thinking, and on to applying emotional knowledge. The last component of the framework emphasizes the regulation of emotion (see Chapter 38, this handbook). The lesson plans exploit the opportunities to learn in each element of the framework and provide active learning situations for gifted students that use psychology and the arts as media for understanding.

Emotional intelligence is defined as "the ability to perceive and express emotions, to understand and use them, and to manage emotions so as to foster personal growth" (Salovey et al., 2000, p. 506). Although much rhetoric about emotional intelligence has not progressed to the level of sustained research, some has (see Mayer, Caruso, & Salovey, 1999). These authors' continued work to develop a theoretical framework for understanding emotional intelligence and a test to assess it provide an important avenue for developers of gifted curriculum to forge emphases at each relevant stage of development for K–12 learners in school.

Researchers, teachers, and counselors have observed a rather consistent set of issues that plague gifted students. Strop (2002) found that a group of seventh- and eighth-grade talent search students worried most about universal concerns, performance, and getting along with others. When these students were asked to rank order specific issues, three emerged as top priority: establishing and maintaining positive relationships with peers, dealing with oversensitivity to what others say and do, and making appropriate career choices. Working specifically on organizing curriculum around these issues may be warranted. The first two may be embedded within an emotional intelligence framework approach. Career development, however, would require its own emphasis, especially at middle school and high school levels (see Chapter 41, this handbook). At the early preteen level, students responded positively to weekly development-oriented discussion groups for all students on affective issues, conducted over a five year period. Lack of receptivity at early stages of the program appeared to be related to topic selection, grouping of students by gender, training for facilitators, and sufficient time for discussions—all program development issues that can be modified to assure greater success (Peterson, 2003; Peterson & Lorimer, 2011, 2012).

Concerns about the social and emotional effects of high stakes secondary programs were examined in a study of international baccalaureate students' stress and related coping strategies (Shaunessy & Suldo, 2010). Findings suggested that both gifted and nongifted students experienced similar levels of stress and comparable types of coping strategies. Some differences were found among gifted student responses to anger, humor, and problem-solving. These results suggest that where rigorous academic expectations are similar for gifted and nongifted students, affective responses appear to be comparable as well.

THE ROLE OF ETHICS IN CURRICULUM DEVELOPMENT

Perhaps in the consideration of the development of creative and innovative talent, it is important to consider the underside of such deliberate development in the absence of ethical values. We can end

up creating monsters, human beings who have lost their very humanity to the thrill of the search for answers to the latest puzzle or the solution to constructing the best mousetrap. It is critical to consider ways to infuse the need for ethical and moral leadership in students who have the ability to make societal contributions on a grand scale. These students may benefit from a curriculum that includes the use of moral dilemmas, case studies of others who have used their work in questionable ways for self-glorification, and an emphasis on the development of emotional intelligence which allows them to understand and express emotions in themselves and others, while also learning to channel such emotions for altruistic purposes. The infusion of these topics and skill sets should be a critical part of designing curricula for advanced learners. Again, as with affective development in the curriculum, moral and ethical issues should be embedded in the fabric of the work, important for discussion in science and math classrooms, as well as in classrooms for language arts and social studies (Tirri, 2010).

THE ROLE OF STANDARDS

Because contemporary schools function in a standards-based environment, it is important to integrate the knowledge and skills of innovation into the required standards that need to be addressed and assessed. Current efforts have been made to differentiate the new standards in math, language arts, and science for use with gifted learners (see Adams, Cotabish, & Ricci, 2014; Hughes, Kettler, Shaunessy, & VanTassel-Baska, 2014; Johnsen, Ryser, & Assouline, 2013). Although these guidelines make the standards more appropriate for advanced learners, they also are geared toward developing the skills of innovation through a project-based learning model that honors the development of collaborative research projects, the presentation of data findings and their interpretation, articulated in all subject areas. These skill sets are central to the enterprise of innovation where thinking and doing are interchangeable processes in the world of learning. The new standards may be important points of departure from the nature and level of learning required to develop high-level skills in gifted students. Each curriculum area has a set of standards that guide general curriculum work. Language arts, math, and science have new Common Core State Standards (CCSS) and Next Generation Science Standards to use. Other curriculum areas have their own national, state, and/or local sets of standards as well.

In addition to the overt standards that teachers are required to address in schools, it is important to think about using hallmark high school programs for gifted learners as a standard for the level of advanced work to which these students should be exposed at early stages of development. Advanced placement tests and international baccalaureate examinations should be used to calibrate the level and type of thinking and problem-solving that will be required at senior high school levels.

Using standards as baseline for what gifted students need is the most pragmatic way to approach curriculum design and development for the advanced learner. Only then can differentiation be accomplished in a way that integrates, extends, and calibrates the appropriate level of advancement required.

USE OF CURRICULUM MODELS

Numerous curriculum models in gifted education have been developed and implemented. Few, however, have been subjected to valid and rigorous research (VanTassel-Baska & Brown, 2007). Curriculum design and implementation for gifted and advanced learners in the present age of content standards requires careful delineation of the standards at a general education level and a gifted and advanced level. Curriculum designers and researchers must work in conjunction to develop and field test differentiated curricula in a way that validates differentiated outcomes. The use of a well-researched curriculum model may be helpful in that process to ensure that differentiation is designed into units of study. Of the few models that do have research evidence, the integrated curriculum model (ICM) has the greatest amount of research on effectiveness to date.

The model was initially designed for the development of curriculum for gifted students, on the basis of the research available in the 1980s. The evidence at the time pointed to the need for advanced

curriculum that was complex and offered in-depth experiences that also provided intellectual ideas to read about and discuss. The model is heavily influenced by the work of Adler and the Paedaeia Project, a popular approach to curriculum-making in general education at that time. It is an effective amalgam of approaches for curriculum design for high-end learners that emerged from general curriculum design work. Secondly, the model is proven to be an effective tool for teachers to use in the design of curriculum units of study. Workshops move teachers through the process of using the ICM for unit development, with resulting quality products. In an example of the large-scale use of ICM, the state of Indiana purchased 10 units of study, one per grade level from grades 1 to 10, as models for the state in gifted education. Finally, the model provides an easy template to use when designing curriculum that aligns with the new CCSS and Next Generation Science Standards. The emphasis on important concepts that are cross-disciplinary, higher level thinking, and advanced content align well to the demands of these new standards. On the basis of this quality, the ICM is an organizer for the National Association for Gifted Children (NAGC) guidebooks for teachers to use in differentiating the new standards. The ICM is a model that is deeply rooted in the research-based practices of gifted education for the past 30 years, and thus provides an easy reference point for discussing design and development of curriculum.

VanTassel-Baska's (1986) ICM was specifically developed for high-ability learners. It has three dimensions: (a) advanced content, (b) high-level process and product work, and (c) intra- and interdisciplinary concept development and understanding. VanTassel-Baska used the ICM to develop specific curricular frameworks and underlie units in language arts, social studies, science, and more recently, math and second language learning.

Research has been conducted to support the effectiveness of these curricular units with gifted populations within a variety of educational settings. Specifically, significant growth gains in literary analysis and interpretation, persuasive writing, and linguistic competency in language arts have been demonstrated for experimental gifted classes using the developed curricular units compared with gifted groups not using them (VanTassel-Baska, Johnson, Hughes, & Boyce, 1996; VanTassel-Baska, Zuo, Avery, & Little, 2002). Other studies have shown that using the problem-based science units embedded in an exemplary science curriculum significantly enhances the capacity for integrating higher order process skills in science (VanTassel-Baska, Bass, Ries, Poland, & Avery, 1998), regardless of the grouping approach used.

Findings from a 6-year longitudinal study that examined the effects over time of using the College of William and Mary language arts units for gifted learners in a suburban school district suggest that for gifted student in grades 3 through 5 learning was enhanced at significant and educationally important levels in critical reading and persuasive writing. Repeated exposure over a 2 to 3 year period demonstrated increasing achievement patterns, and the majority of stakeholders reported the curriculum to be beneficial and effective (Feng, VanTassel-Baska, Quek, Bai, & O'Neill, 2004). An earlier study had documented positive change in teacher attitude, student motivational response, and school and district change (VanTassel-Baska, Avery, Hughes, & Little, 2000) as a result of using the ICM science and language arts curricula over 3 years.

A subanalysis of the language arts data across settings suggested that it is successful with low-income students, it can be used in all grouping paradigms, and learning increases when multiple units are used (VanTassel-Baska et al., 2002). In another study using the College of William and Mary language arts units, results suggest that enhanced learning also accrued for teachers and students (Swanson, 2006).

Research on the use of the social studies units suggested that unit use significantly impacts critical thinking and content mastery, using comparison groups (Little, Feng, VanTassel-Baska, Rogers, & Avery, 2007). Moreover, positive changes in teacher behaviors for using differentiated strategies also were noted in this study.

Teacher training and development in the use of specific teaching models is an integral component of the ICM model. Training workshops have been conducted in 30 states, and the College of William and Mary Center for Gifted Education offers training annually. There is a strong relationship to core

subject domains, as well as national standards alignment. The curricula based on the model was developed using the national standards work as a template. Alignment charts have been completed for national and state standards work in language arts and science.

The ICM units are comprehensive by subject area in that they span kindergarten through grade 10 in language arts and kindergarten through grade 8 in science. Social studies units are available for grades 2 through 10, as well. Selected units of study in math are available in grades 3 through 8. The ICM model has been used for specific school and district curriculum development and planning in many districts in the United States. It has also been used internationally, in countries like Canada, Australia, Japan, Korea, Hong Kong, Singapore, and the United Arab Emirates.

Subsequent studies assessed the effectiveness of the ICM units in language arts at the elementary-school level and science at the elementary-school level with low-income learners in Title I schools (those that have more than half of their population on free or reduced lunch status due to poverty) using critical thinking as one outcome variable of interest. In Project Athena, the language arts program, findings on student learning and teacher learning appeared promising (VanTassel-Baska, Bracken, Feng, & Brown, 2009). Experimental students did significantly better than control students in critical thinking and reading comprehension, with all groups registering significant growth gains from using the curriculum regardless of ability, gender, or ethnic background. Experimental teachers scored significantly higher on the frequency of use and effective use of differentiated strategies across 2 years. Growth gains for teacher use of differentiation strategies remained stagnant in the 3rd year. Also of note, experimental teachers who had used the curriculum for 2 years and received commensurate training demonstrated significantly enhanced use of differentiated strategies over 1st year experimental teachers (VanTassel-Baska et al., 2008).

As an outgrowth of Project Athena, *Jacob's Ladder*, a reading comprehension program intended to move students from lower order to higher order thinking skills in the language arts (VanTassel-Baska & Stambaugh, 2006b), was designed and developed for use in Title I schools. A series of workshops aided teachers in implementing the program. Two dissertation studies support the use of *Jacob's Ladder* with students from low-income backgrounds, and both suggest growth in critical thinking, reading comprehension, and enhancing interest in the reading process.

Project Clarion, an elementary-school level science program, has produced important findings that relate to several areas of interest. Student learning gains have been strong, with students demonstrating critical thinking increases, science achievement increases, and science concept learning gains. Using quasi-experimental designs, the project has demonstrated significant and important learning gains in these dimensions with effect sizes ranging from .3 to .6 (Kim, VanTassel-Baska, Bracken, Feng, & Stambaugh, 2014). Two other studies also used the science units from Project Clarion with strong results, especially for enhancing the teaching of science at elementary-school levels (see Cotabish, Dailey, Robinson, & Hughes, 2013).

The natural proclivities, personality, and interests of students will likely influence the paths of talent development that they follow. The role of educators is to provide opportunities and guidance, on the basis of available data on student aptitudes, interests, and values. Existing curriculum models that guide the differentiation process may be helpful and should be used in this work. Because the ICM deliberately focuses on the use of advanced content, higher level skills and processes, and an interdisciplinary concept, it may continue to prove its utility for such work in the future.

USE OF TEACHING MODELS FOR CLASSROOM IMPLEMENTATION

Selecting models that enhance the learning of higher order process skills is desirable because their utility has been proven in countless classrooms, and research suggests that a few selected models used over time enhances learning more strongly than eclecticism (Hillocks, 1999). Several models have proven useful to teachers in addressing the higher order skills of creative and critical thinking in the classroom.

Amabile (1983) provided one of the most viable creativity models at a theoretical level, which focuses on the relative importance of three areas: domain-specific knowledge and the ability to apply it to worthy problems, motivation and interest, and creativity-relevant skills that support contributions to a given domain of learning. This model emphasizes a focus on developing products judged to be exemplary by those in the domain and the importance of contexts for nurturing creative behavior (Amabile, 2001).

Researchers who have studied creative individuals in several different fields (Simonton, 1994; Torrance, 1993) have been struck by the sheer work and effort that creative individuals are willing to devote to their area of specialty. Such individuals are clearly in love with the work they do, but also continue with it despite criticism, lack of support, or time alone. The single variable that these researchers focus on, however, is the capacity and actualization of work over time. The ways in which educators can instill creativity in students does not vary considerably from the fundamental values of basic schooling (see Chapter 19, this handbook).

PROBLEM-BASED LEARNING

One model that promotes higher level thinking and real world problem-solving is problem-based learning, a curriculum and instructional model that is highly constructivist in design and execution. First used in the medical profession to better socialize doctors to real-world patient concerns, it is now selectively used in educational settings with gifted learners (Boyce, VanTassel-Baska, Burruss, Sher, & Johnson, 1997; Gallagher & Gallagher, 2013; Gallagher & Stepien, 1996; Gallagher, Stepien, & Rosenthal, 1992). Problem-based learning involves several important features:

- Students oversee their own learning. They work in small investigatory teams to grapple with a real-world unstructured problem in which they have a stake, and they must solve it within a short period of time. Students become motivated to learn because they are in charge at every stage of the process.
- The problem statement is ambiguous, incomplete, and yet, appealing to students because of its real-world quality and the stakeholder role that they assume in it. For example, students may be given roles as scientists, engineers, politicians, or project-based administrators who must deal with the problem expeditiously.
- The teacher is facilitative not directive, aiding students through question-asking and providing additional scaffolding of the problem with new information or resources. He or she becomes a metacognitive coach, urging students through probing questions to deepen their inquiry.
- The students complete a need-to-know board early in the process, which allows them to plan how they will attack the problem. First, they identify from the problem statement what they already know, what they need to know, and how they will find it out. Next, they can prioritize what they need to know, make assignments, and set up timelines for phases of work. This emphasis on constructed metacognitive behavior is central to the learning benefits of the approach.

These features work together in engaging learners in important problems that matter in their world. Many times, problems are constructed around specific situations involving pollution of water or air, dangerous chemicals, spread of infectious disease, or energy source problems. Students learn that the real world is interdisciplinary in orientation, requiring the use of many different thinking skills and kinds of expertise.

To work through a problem-based learning episode, students must be able to analyze, synthesize, evaluate, and create, all of which are higher level thinking tasks (Anderson & Krathwohl, 2000).

CRITICAL THINKING

Higher level process skills require students to make nuanced judgments and interpretations about data. The Ennis model of critical thinking, which uses judgment and inference as the centerpiece of the critical thinking process, teaches students to enhance these skills (Ennis, 1996). Although the model has been used more extensively at a

high-school level, it can be applied with gifted students at middle-school levels with successful results. An important aspect of this model is the 12 dimensions of critical thinking Ennis (1996) derived from a study of the literature and his own education in philosophy. He viewed critical thinking as a set of inferencing skills based on making different types of judgments.

Another model that has proven helpful for many teachers and other educators in the application of critical thinking to real life has been the use of Paul's (Elder & Paul, 2004) elements of reasoning. These elements include purpose, concepts, assumptions, data and evidence, inferences, consequences, and implications. Teachers can use this model as a heuristic in reading, writing, and conducting research to help students focus on the logic of text.

Examples of the application of the Paul's (Elder & Paul, 2004) model may be found throughout the College of William and Mary curriculum in all subject areas. The following questions illustrate the model's utility in addressing current event topics in the classroom:

- What is the purpose of our discussion on the current world economic problems or issues?
- What concepts in economics are central to understand what is going on (e.g., currency evaluation, quantitative easing, supply and demand issues in trade agreements, inflation and deflation)?
- What assumptions do we as Americans often make about the strength of our economy? What evidence do we use to support those assumptions?
- What data and evidence do we use to judge the economic picture in the United States or worldwide?
- What inferences do we draw about the health of the economy when (a) the stock market goes down by 200 points, (b) the housing market increases in number of homes sold per month, (c) the federal reserve raises interest rates, (d) the number of jobs increases monthly, or (e) a country cannot manage its debt?
- What are the implications of trends in the global economy for the economy of the United States?

The use of the problem-based learning model and a model for teaching thinking enhances the probability that gifted students will internalize these skills and processes for future, as well as present, learning. It is important to realize the power inherent in the use of these models as a part of classroom routine that is practiced daily and provides the needed differentiation in respect to higher level thinking and problem solving in critical and creative modes.

METACOGNITION

Students also need to learn how to regulate specific learning behaviors and deliberately use executive processes for deeper learning to be achieved (Schunk, 2000). These behaviors are critical for long term project work and research. *Metacognition* refers to two types of knowledge: self-knowledge in respect to declarative, procedural, and conditional situations (Bereiter, 2000), and self-knowledge in respect to controlling how knowledge is used (i.e., the planning, monitoring, and assessing of the process in oneself; Beyer, 2000). Each aspect is a necessary way of conceptualizing the skills needed for gifted learners to become effective in their thinking and problem-solving activities.

Research suggests that metacognition is developmental, beginning early, but continuing well into adulthood. It also appears to be more advanced in adults than children, and in gifted students rather than in average students (Shore, 2000). This is especially true in transferring metacognitive skills to new domains of activity. Metacognition also is easier to teach to gifted learners, and they appear to benefit more from being taught the strategies than average learners (Shore, 2000). Gifted learners work harder at learning strategies and appear to be more motivated than nongifted students. Perhaps this is because of a larger information base gifted students have, which supports metacognitive regulation strategies—metacognition improves with more knowledge in a domain (Sternberg, 2001).

The findings on metacognition from the research literature strongly suggest the value of direct instruction, collaborative learning across age levels, and reflection techniques (e.g., journaling, discussion, introspection; Schraw & Graham, 1997).

CAREER DEVELOPMENT

One of the best researched areas of intervention for gifted students, career development provides a focus on the future for gifted learners and their families at critical stages. Career development is an exploration of interests, aptitudes, and values across throughout school, culminating in actual experiences that model what it means to work in a given career (see Chapter 41, this handbook). Although career development is often mentioned in texts as an important aspect of curriculum development, it is often overlooked. Part of the reason may rest with the issue of whose responsibility it is to deliver the curriculum of career development—the counselor, the trained teacher of gifted students, or the regular classroom teacher. At the elementary-school level, this is a reasonable quandary. At middle-school and high-school levels, interests and aptitudes have advanced in ways that suggest career development experiences can be hands-on through mentorships and internships, neither of which require direct involvement from school personnel (e.g., teachers). Oversight by teachers and/or school counselors would still be necessary, however. Research has continued to suggest that mentorships are important to the future growth and development of gifted learners (see Feng, 2007), even when conducted through online sources (Olszewski-Kubilius, 2015). At elementary-school levels, career development may take many forms in the classroom, from the use of biographies of eminent people to discussions of careers of interest to particular groups of gifted learners (Robinson, Shore, & Enersen, 2007).

Perhaps the area of greatest need in career development is the opportunity to assess student areas of exploration and to guide students in the quest for understanding what skills and habits of mind are required by certain careers. Off-level testing, used in combination with interest inventories and values scales, provides data to guide students as early as seventh grade toward their area of predisposition—whether it be STEM-related fields or other productive professional areas in humanities, social sciences, or the arts (Achter, Benbow, & Lubinski, 1997). We also know that life stories of scientists who made important contributions have been analyzed in respect to the value of early opportunities (Shavinina, 2009). This knowledge, augmented with course planning in middle school and high school, would go a long way to enhance the career development strand for gifted learners. More recent data continue to support that starting STEM-related career choices early can only help gifted learners to fulfill their potential in these areas (Park, Lubinski, & Benbow, 2013). A more recent study (Lubinski, Benbow, & Kell, 2014) continues to suggest that domain-specific ability in math predicts creative accomplishment in professional careers related to that ability (see Chapter 31, this handbook). Therefore, more targeted career counseling by early secondary levels can only enhance the path for students with precocious abilities in key domains.

TALENT DEVELOPMENT

A contemporary interest in talent development in schools has led to a broader focus on which students should be served in gifted programs, as well as a diversification of the offerings. Such an emphasis has also affected gifted education by focusing on areas of aptitude and interest in cognitive, affective, and aesthetic domains. Arts opportunities, affective development options, and cognitive approaches provide a rich array of talent development possibilities (see Chapter 16, this handbook).

As educators consider the implications of a talent development paradigm for curriculum development, they face a deliberate need for scope and sequence within and across core areas of the school-based curriculum. Beyond that, they also face the continuing need to connect opportunities offered at one level of learning to the next, as the goal is optimal development in any area of positive human endeavor.

Examples abound as to how to carry this out, especially at the high-school level where aptitudes and interests coalesce in a number of productive areas. The best examples come from the arts and athletics, where talent development is a business on which many careers are staked. In mainstream academics, the model has not quite caught on so well, as we seem unable to believe that mathematical and scientific talent can be mined in the same way with the same results.

Longitudinal evidence now suggests that students exposed to healthy doses of acceleration in core subjects during their high school years outperform students who did not have these opportunities in adult performance-based areas such as number of patents, tenure at prestigious universities, number of publications, prizes, and other tangible products of accomplishment in a given field (Wai, Lubinski, Benbow, & Steiger, 2010).

Curriculum design and development work that will accommodate the talent development process needs to focus on the macrocurriculum products of curriculum maps and syllabi for advanced coursework. It also needs to involve the collaborative efforts of teams from high school and college working on calibrations of the nature of advanced work offered in each subject area. The model for such work is seen in the advanced placement program, the international baccalaureate, and Cambridge programs. More subjects and more grade levels will need to be involved to impact the field of gifted education and to benefit gifted learners in the future. Moreover, macroplanning must also consider the ethical dimensions of curriculum for gifted students (Tirri, 2010).

USE OF APPROPRIATE ASSESSMENTS FOR LEARNING

Research on the use of alternative assessments for learning (VanTassel-Baska et al., 2008) suggests that gifted students can be assessed in ways that approximate their authentic learning level through performance-based assessment that is advanced, is open-ended, focuses on problem-solving, and asks students to articulate thinking. Moreover, the use of such assessment approaches has been effective at enhancing the learning of African American students and students from poverty (Swanson, 2006).

Assessment of standardized off-level approaches that calibrate to advanced programs in core academic areas is the foundation of research on acceleration in content areas (Lynch, 1992; Olszewski-Kubilius, 2007; Swiatek, 2002). Research documents the efficacy of fast-paced curriculum, provided through intensive learning contexts in alternative educational settings such as summer, Saturday, and online programs. Compacting studies demonstrate that gifted students do not lose any content knowledge or skills by moving more rapidly through material, or by testing out of it altogether (Reis & Purcell, 1993; Reis & Renzulli, 2006). Meta-analyses continue to support the efficacy of acceleration in curriculum for gifted students through careful assessment (Rogers, 2015).

COLLABORATION THROUGHOUT THE DEVELOPMENT PROCESS

Curriculum development for gifted students requires the expertise of several people in the educational spectrum. Teachers and content experts are central to the development process. These experts can provide a strong sense of how to structure advanced curriculum opportunities, how to organize these opportunities most appropriately throughout school, and how to ensure that gifted students' curriculum is not ignoring important emphases in content. Moreover, educators of gifted students are needed to ensure that differentiated curriculum, instruction, and assessment are included within a unit of study, and to guide teachers toward existing materials that may aid them in further development of the curriculum. Teachers offer an important resource to this process, knowing what students are capable of doing at a given stage of development, and having creative ideas about meeting student outcomes. Each of these groups should come together for work sessions, critiquing, and discussions of the state of the evolving curriculum. Through such sessions, the blend of expertise moves the curriculum to ever higher levels of consonance with the blueprint and creates a common understanding of the nature of impending implementation issues.

KEY FEATURES FOR DESIGNING DIFFERENTIATION IN THE CURRICULUM

When an educator designs curriculum for gifted students, it is critical that key features of differentiation are addressed in the process. These features may be treated as an integral part of the design or as separate components. The nature of the subject area, the

demands of the core curriculum, and teacher competency will contribute to this decision. However, gifted learners need to be exposed to a curriculum that is attentive to their needs, and research suggests that these features contribute to positive outcomes in learning. Moreover, the absence of these features negatively impact their advanced learning potential.

- Acceleration techniques (preassessment, formative assessment, and pacing): This feature calls for attention to developing consistent and ongoing acceleration approaches in determining the need for advancement within and across content areas. It suggests the strong use of assessment to determine curriculum level and content, and suggests that the instructional approach of acceleration is a modality recognized in the instructional arsenal of teachers working with gifted students.
- Differentiation strategies: Differentiation helps to adapt curriculum for gifted students through acceleration, complexity, depth, challenge, creativity, and abstraction (see VanTassel-Baska, 2003).
- Culturally sensitive curriculum approaches: Curriculum for gifted students needs to be sensitive to culturally different learners. This means that teachers should select reading materials by authors from diverse culturals, choose biographies that illustrate the contributions of multiple cultural groups, and present a view of history that explores multiple perspectives, including minority viewpoints.
- Inquiry-based strategies: Inquiry techniques form the backbone of differentiated instruction and its many manifestations in problem-based learning, project-based learning, and discussion strategies like Socratic seminar and shared inquiry (see VanTassel-Baska & Brown, 2007). This feature also suggests the power of asking higher level questions as a specific model for enhancing inquiry in students.
- Research-based materials: Curriculum materials developed through research over the past 20 years provide an important base for curriculum development in the core subject areas. These materials have been piloted, field-tested, and researched for their effectiveness with gifted learners. As such, they provide an important resource to meeting the standards in curriculum (see VanTassel-Baska & Little, 2011; VanTassel-Baska & Stambaugh, 2006a).
- Instructional models: These models teach critical and creative thinking, research, and problem-solving skills. It is important that districts adopt models that can be used across grade levels to provide a common language around these skills and make professional development more articulated.
- Information technologies: A strong curriculum for gifted students will use an integrated technology approach in implementing learning. Many approaches to this are possible within classrooms and in tandem with special computer labs.
- Metacognitive strategies: All curricula for gifted students should attend to the need of gifted learners to reflect on what they have learned, as well as engage in serious planning, monitoring, and assessing of that learning, especially when it applies to project work and research efforts. Examples include engaging students in such questions about their performance and in activities that extend their thinking in a reflective mode.
- Community resources: Strong curriculum for gifted students will find ways to include community opportunities (e.g., speakers, field trips, mentorships and internships). Such opportunities should be available to gifted learners at multiple stages of development.

WHAT MAKES DIFFERENTIATED CURRICULUM WORK?

For curriculum differentiation approaches to be successful in implementation, several variables must work in unison to guarantee cohesion in effort (VanTassel-Baska & Little, 2011). Using the ICM development model effectively requires schools to implement different aspects of the curriculum puzzle simultaneously, including the following:

- Using diagnostic assessment and modifying the curriculum: At every grade level, the core curriculum must be remodeled to respond

appropriately to the needs of gifted learners. Such an effort is best effected using a diagnostic tool to assess the functional level of gifted students, and to streamline curriculum on the basis of the results. Ongoing formative assessment is recommended to ensure students are gaining needed competencies, but also progressing at a rate commensurate with their needs.

- Grouping gifted learners: Research on grouping gifted learners suggests the importance of using models effective in this regard—cluster grouping, pull-out classes, and self-contained classes. These forms of grouping suggest that students can grow significantly when such approaches are coupled with differentiated curriculum (Rogers, 2015).
- Using research-based materials: Although it is admirable to think that teachers can and should develop curriculum from scratch, it is more effective to use materials that have been specifically designed for gifted learners and tested for effectiveness. The materials are available for use in remodeling, as well as adapted implementation. Even with using these materials, additional units of study need to be developed, especially for use in self-contained programs. The processes described in this chapter are applicable to such new units of study. (Appendix 23.1 provides a list of differentiated materials by subject area that are effective with gifted students.)
- Evaluating advanced learning through performance-based assessments and/or portfolios: Although differentiated curriculum is important, so too is a differentiated assessment approach. Two models for assessment provide authentic results to gauge gifted student growth in learning. First, performance-based assessments ask students to demonstrate the qualities of higher level thinking, problem solving, creative response, and articulation in a task demand. Sometimes these assessments are project-based, requiring multiple days for completion, and sometimes they require response in a short amount of time (e.g., during a 50-min class). Rubrics typically focus on the important learning dimensions identified in unit outcomes. Second, a portfolio captures key learning that has occurred during a given time. Often students can select their best work, and explain their selections and the nature of learning accrued through their work. Portfolios can be showcased with parents and community, allowing deeper insights into the learning process that gifted students experience (see VanTassel-Baska, 2008).
- Targeting instruction in areas of advanced learning capacity: Not all gifted students need advanced instruction in all areas of learning. For example, the academic preferences and aptitudes of middle school students may cause them to gravitate toward STEM disciplines. Programs and curricula should try to provide the optimal match to students' interests and aptitudes, unleashing greater motivation and desire for learning as a result.
- Providing direct and facilitated instruction: Too often gifted students' learning is assumed to be independent, or at most, facilitated by a coach. However, research suggests that gifted learners benefit from direct and facilitated learning. Teachers must have key strategies to use with these learners that enhance their learning through direct instruction coupled with strong inquiry-based discussion and problem-solving activities. Independent research should be coupled with group research. Reading activities should be coupled with discussion groups (e.g., Socratic seminars). Project work should be paired with relevant teaching sessions on aspects of the processes and content to be learned.
- Providing grouped instruction: Contact time is a critical variable in deciding how to implement curriculum effectively. Less than two hours per week in a grouped learning context limits the authentic learning of gifted students. Ideally, more than half of gifted students' time should be spent with others of equal or greater ability. The amount of time that a target group of learners is exposed to differentiated curriculum strongly impacts the extent of their learning (Callahan & Herzberg, 2016).

Once such implementation has been effected, student outcomes for the curriculum have a chance to be realized.

PROFESSIONAL DEVELOPMENT

Any effective implementation plan for curriculum requires a strong emphasis on professional development that is conducted systematically and continuously for the effort to be institutionalized (Learning Forward, 2011; National Governors Association Center for Best Practices, 2010). Many states and districts have not mandated such training nor have they focused on the need to differentiate for gifted learners, leaving such details up to classroom teachers and gifted specialists. The result of this oversight is a fragmented and incoherent implementation of the required curriculum for top students, with parents concerned about the level of rigor afforded by the new standards.

Just as professional development is necessary for effective curriculum implementation, so too must teachers be trained in the processes of differentiation. Currently, many teachers working with gifted students have no such systematic training (VanTassel-Baska, 2008), nor do they have a sufficient background in curriculum development to prepare them for the nature of the tasks required. If the gifted education field does not shift focus from differentiation to new standards and requirements, it risks extinction through fragmented efforts and underprepared personnel.

SCOPE AND SEQUENCE OF CURRICULUM

Curriculum for gifted students requires long-term planning throughout school to accommodate the need of advanced learners for accelerated content and alternative options within a subject area. Consequently, the scope and sequence of curriculum opportunities for this population must be articulated in writing for all grade levels. School district policy must address earlier testing out of standards, pretesting of coursework that students already have mastered, and alternative independent study opportunities that will provide rich curriculum options.

In math, in particular, there is a real concern that the new standards may be driving out the traditional precalculus sequence that currently enables gifted students to accelerate their mathematics learning in a predictable way. Students and parents are frustrated and confused when districts do not discuss and work out a viable scope and sequence for top learners, which integrates accelerative opportunities within the CCSS. In math and language arts, discussion and articulation of offerings meed to occur at each level (Hughes et al., 2013; Johnsen & Sheffield, 2012; Johnsen et al., 2013).

Yet, acceleration of learning in other subjects, and sometimes in all subjects, may be required for gifted learners. The construction of scope and sequence charts may prove helpful and necessary to support groups of students who demonstrate advanced learning.

ADMINISTRATIVE SUPPORT

For curriculum designed and developed specifically for gifted learners to be successful, building principals must provide important instructional leadership for the work of implementation. Research suggests that principals must show visible support, be actively involved in the process, and monitor the outcomes if a reform is to work successfully (Cotabish & Robinson, 2012; VanTassel-Baska & Little, 2011). Curriculum implementation for gifted learners is no exception. Awareness is not enough—engagement in organizing collaborative vertical teams of teachers in all core subject areas is essential to ensure that implementation moves forward in an organized and productive way at the building level.

ALIGNMENT

Often arguments have been made that differentiation of core curriculum creates a fragmentation in the scope and sequence of curricular offerings in the key areas of language arts and math. In truth, without careful attention to alignment issues, such results may continue to occur. However, gifted students' education community has been careful to ensure that differentiated work has been aligned with gifted and general curriculum documents.

The resources designed around the CCSS for use by teachers of gifted learners were developed

in alignment with the NAGC programing standards in key areas (Johnsen, 2012), the NAGC & Council for Exceptional Children (2006) teacher education standards, and 21st-century skill sets. The work is connected and integrated in important ways to multiple professional communities, within gifted education, but also across general education.

FUTURE CONSIDERATIONS AND DIRECTIONS

The field of gifted education needs field-based studies to document gifted students' performance in relation to the goals of a differentiated curriculum. It may be assumed that gifted students will perform at more advanced levels, but research evidence is necessary to substantiate those assumptions. Researchers may look for ways to document the effect of differentiated learning experiences because of curriculum modification within the core. How does increasing the complexity of the curriculum in reading and writing lead to advanced-level products and performances in reading and writing? Additionally, given the challenges of implementation, field-based studies may be designed to measure the effects of professional development on the implementation of such curriculum at multiple levels of complexity to account for individual differences between learners.

Studies are also needed that document the affective, moral, and ethical outcomes of differentiated curriculum, not just the cognitive outcomes of achievement that are currently assessed. How have students benefited from a gifted curriculum in respect to their emotional intelligence? What habits have students developed because of gifted program participation? What real-world moral and ethical stances have they debated? These questions are important to consider in researching the effects of a specialized curriculum for this population.

SUMMARY AND CONCLUSIONS

Designing and developing curriculum for gifted students, if it is to be done well, must consider many elements and include various features. It must be attentive to the needs of gifted students that call for cognitive and affective responses at higher levels than the regular curriculum at a given grade level. These well-documented needs provide important signposts for what needs to be done in offering a more advanced, more high-level, and more conceptually based set of experiences. We must also be cognizant of the needs beyond gifted learners, the needs of a society for creativity and innovation, of technological capacity to solve problems and confront issues that are currently without satisfactory resolution. A strong curriculum for gifted students has a responsibility to provide an education that advances our national agenda. Moreover, educators have to consider the context in which a specialized curriculum for gifted students is likely to be delivered. Educators must ensure that specialized curricula for gifted students stay connected to the core curriculum, to fulfill the requirements of the standards but extend beyond them in ways that are essential for gifted students to grow and develop at their pace. Adaptation, extension, and differentiation all become the necessary tools in fulfilling the need for a curriculum for gifted learners throughout their schooling.

APPENDIX 23.1. CURRICULUM EVALUATION CHECKLIST

This chapter introduced several ideas for the design and development of a curriculum for gifted students. The following checklist guides developers as they design curriculum, and is organized according to several sets of considerations. First, it provides the developer key criteria for core curricula in any subject area, noting the adaptations that are necessary in the general features to accommodate gifted learners. Second, the checklist notes the specialized features of a differentiated curriculum for gifted students that should be integrated into the design. Third, the checklist focuses on specific criteria by subject area of curriculum design for advanced learners in that area.

General curriculum elements	Indicators			
	Y	N	U	N/E
Are the rationale and purpose of the curriculum clearly stated?				
Are affective considerations of the gifted being integrated, including an emphasis on identity development, academic planning, and career planning?				
Is the curriculum accelerated for advanced learners?				
Are the curriculum outcomes and instructional objectives addressed systematically through lessons and activities?				
Are the outcomes/objectives measurable?				
Do the lesson outcomes or objectives emphasize high-level concepts, skills, processes, and ideas?				
Are the materials selected on the basis of considerations for the needs of advanced learners?				
Are opportunities for independent as well as group project work specified?				
Is the content substantive and developmentally appropriate for advanced learners?				
Does the curriculum emphasize moral and ethical decision making?				
Has the curriculum been aligned to national, state, and/or local standards?				
Does the curriculum include objectives, activities, questions, assessments, resources, and any other curricular elements needed for implementation?				
Is homework specified within the curriculum at each level and in each subject area?				
Comments and clarification				

Curriculum activities	Indicators			
	Y	N	U	N/E
Is there a proper balance of teacher-directed and student-directed activities?				
Do the activities explore, discover, clarify, and/or extend content?				
Are there opportunities for students to engage in worthwhile extension activities?				
Do activities allow students to discover ideas and concepts more often that they are told ideas and concepts?				
Are activities developmentally appropriate?				
Do the activities include hands-on exploration and active student involvement?				
Comments and clarification				

Instructional strategies	Indicators			
	Y	N	U	N/E
Are varied instructional strategies incorporated in the curriculum?				
Are there varied approaches to grouping, including opportunities for small-group and independent work?				
Do the instructional strategies engage students in problem-finding and problem-solving?				
Do the instructional strategies engage students in sharing ideas and perspectives?				
Do the instructional strategies engage students in practicing decision-making strategies?				
Do the instructional strategies engage students in developing and asking thoughtful questions about what they are studying?				
Does the curriculum include specific questions to ask students?				
Are various types and levels of higher order questions incorporated?				
Comments and clarification				

Assessment of learning	**Indicators**			
	Y	**N**	**U**	**N/E**
Is the assessment process comprehensive based on the outcomes?				
Are assessment activities embedded in individual lessons?				
Is authentic assessment used (i.e., performance, product, and/or portfolio)?				
Does the assessment process incorporate multiple types of assessment (e.g., portfolios, observational behavior checklists, product evaluation, self and peer evaluation)?				
Does the curriculum use pre- and postassessments?				
Is a means of overall curriculum evaluation suggested?				
Are student processes and products acknowledged and assessed?				
Does the curriculum include appropriate rubrics and other criteria for student assessment?				
Comments and clarification				

Thinking skills and metacognition	**Indicators**			
	Y	**N**	**U**	**N/E**
Does the curriculum incorporate techniques for enhancing thinking skills (e.g., teaching the steps of a specific reasoning process)?				
Does the curriculum include questions for discussions and writing that emphasize higher level thinking?				
Does the curriculum routinely emphasize instruction in thinking skills within the context of teaching content?				
Do the activities and questions engage the learner in various levels and types of thought?				
Does the curriculum use a model or models of thinking that guide instruction in thinking skills (e.g., Bloom, Guilford, Paul)?				
Does the curriculum strategically engage students in thinking about their thinking strategies?				
Are opportunities for modeling metacognition included at relevant junctures in the curriculum?				
Does the curriculum engage students in planning, monitoring, and evaluating their progress on a project or activity?				
Does the curriculum engage students in reflecting on their performance and the process of learning?				
Comments and clarification				

Communication	**Indicators**			
	Y	**N**	**U**	**N/E**
Does the curriculum emphasize communication skills relevant to the content area?				
Does the curriculum engage students in active speaking and listening activities?				
Does the curriculum encourage students to respond to one another's presentations through questions, discussion, and critique?				
Does the curriculum provide for advanced reading in the content area?				
Does the curriculum engage students in more than one type of written or spoken communication (e.g., technical, persuasive, creative communication) in the content area?				
Comments and clarification				

Research	Indicators			
	Y	N	U	N/E
Do students engage in research related to the content area?				
Are students directly taught a research model?				
Is student research issue-based, focusing on issues involving multiple perspectives and stakeholder groups?				
Are the opportunities to engage in research practices authentic to the discipline?				
Are students encouraged to participate in the development of researchable questions?				
Is research work shared with multiple audiences?				
Comments and clarification				

Technology	Indicators			
	Y	N	U	N/E
Does the curriculum encourage students to use technological tools in conducting research (e.g., CD-ROM, email, Internet)?				
Is the technology use relevant to the content and complementary to the instruction?				
Does the curriculum use relevant software programs (e.g., word processing, spreadsheets)?				
Does technology use provide access to resources unavailable in other formats?				
Is technology used to actively engage students in higher order thinking skills and activities?				
Are activities that involve the use of technology differentiated for various levels of technological competency?				
Comments and clarification				

Interdisciplinary applications	Indicators			
	Y	N	U	N/E
Does the organizing concept or topic of various curriculum materials naturally bring multiple disciplines together?				
Is the concept being studied demonstrated in at least two other disciplines?				
Are there lessons that focus on making interdisciplinary connections?				
Are interdisciplinary connections fostered at a conceptual abstract level?				
Are there opportunities for students to develop language and reading skills in the content area?				
Comments and clarification				

Materials and resources	Indicators			
	Y	N	U	N/E
Do the materials and resources sufficiently support lesson activities?				
Do the handouts contribute to the enhancement of learning?				
Do the materials and resources pull from multiple types of sources, including primary and secondary sources, technical and creative material?				
Are resources that support student extension activities identified or provided?				
Are resources to support teacher background knowledge identified or provided?				
Comments and clarification				

Differentiation for advanced/gifted students	Indicators			
	Y	N	U	N/E
Are the selected activities, resources, and materials sufficiently challenging for advanced learners?				
Are concepts treated in sufficient depth?				
Are there opportunities for creative production?				
Are there opportunities for working with integrated higher order thinking and problem-solving processes?				
Are students given sufficiently complex issues, problems, and themes to explore?				
Are students given ample opportunities through curriculum opportunities to construct meaning for themselves?				
Does the content and instruction provide a sufficiently high level of abstraction?				
Is the reading material sufficiently advanced?				
Does the curriculum allow for implementation with different levels of advanced ability?				
Is there adequate articulation of open-ended questions that encourage multiple or divergent responses?				
Are there appropriate opportunities for independent learning?				
Are there sufficient opportunities for meaningful group project work?				
Comments and clarification				

Language arts	Indicator			
	Y	N	U	N/E
Is the choice of literature or reading material based on intellectual, affective, and multicultural considerations?				
Does the curriculum emphasize moral and ethical behaviors on the basis of real world dilemmas?				
Does the curriculum provide activities conducive to developing and practicing critical reading skills?				
Does the curriculum incorporate textual analysis of conceptually rich literature?				
Is there a balanced perspective on at least three diverse cultures in the reading materials, classroom activities, and discussions?				
Does the curriculum provide opportunities to apply data and evidence to make judgments?				
Does the curriculum emphasize persuasive writing?				
Does the curriculum emphasize affective development?				
Does the curriculum promote the use of workshopping techniques and revision in the writing process?				
Does the curriculum emphasize the development of word relationships, such as synonyms, antonyms, and analogies?				
Does the curriculum include opportunities to learn advanced vocabulary?				
Does the curriculum encourage the development of linguistic competence in English, with emphasis on grammatical structure?				
Does the curriculum include opportunities to learn about the history of language, etymology, and/or semantics?				
Does the curriculum promote the use of persuasive speaking and debate?				
Comments and clarification				

Mathematics	Indicators			
	Y	N	U	N/E
Are important mathematics concepts covered in sufficient depth?				
Does the content include the history of mathematical ideas and the biographies of mathematicians?				
Are the mathematics presented clearly and accurately?				
Does the content progress from the concrete to the abstract?				

(*continues*)

Mathematics (*Continued*)	**Indicators**			
	Y	**N**	**U**	**N/E**
Is problem-solving an integral part of the curriculum?				
Do activities emphasize oral and written communication of ideas and strategies?				
Do students communicate ideas and concepts in visual form (e.g., through graphs, posters, diagrams)?				
Is there an emphasis on relevant real-world mathematical problems and connections?				
Is there an emphasis on connections among different areas of mathematics, such as measurement and geometry or number theory and algebra?				
Do activities provide opportunities for students to make conjectures and attempt to verify or prove them?				
Does the curriculum promote the habits of mind of mathematicians (e.g., curiosity, tenacity, collaboration, skepticism)?				
Do activities provide opportunities for divergent thinking and illustration of various thinking processes for a single problem?				
Comments and clarification				

Science	**Indicators**			
	Y	**N**	**U**	**N/E**
Are important science concepts covered in sufficient depth?				
Is the science content accurate and presented clearly?				
Is the content linked to broad scientific concepts and to other areas of learning?				
Is there an emphasis on the integrated scientific research process?				
Is the curriculum problem-based or project-based?				
Does the curriculum include considerations for the moral, ethical, and historical dimensions of science and technology?				
Are there opportunities for open-ended scientific investigation?				
Are laboratory work and fieldwork integral to and integrated with the curriculum?				
Are there opportunities for students to work together to investigate real-world scientific and technological problems?				
Does the curriculum include opportunities for building and testing hypotheses?				
Does the curriculum allow for questioning of assumptions and diverse opinions on scientific topics and concepts?				
Comments and clarification				

Social studies	**Indicators**			
	Y	**N**	**U**	**N/E**
Are important concepts in the social studies disciplines covered in sufficient depth?				
Is there evidence of attention to multiculturalism or cultural diversity in the selection of reading materials?				
Are materials used with attention to multiple points of view and different stakeholder perspectives?				
Is there an emphasis on the meaning and the process of the content area (e.g., history, geography) rather than isolated facts and events?				
Is critical thinking developed as an analytical tool for use by students?				
Are simulations or scenarios created that involve students in problem-solving opportunities (e.g., problem-based learning)?				
Is there sufficient use of primary source material?				
Is the social science research model taught and used with students?				
Are students encouraged to develop their own research projects and given a research model?				
Do learning opportunities or examples link content to current events or real-world problems?				
Comments and clarification				

Note. Y = yes, N = no, U = unclear, N/E = not evident. From *Curriculum Planning and Instructional Design for Gifted Learners* (pp. 247–255), by J. VanTassel-Baska, 2003, Denver, CO: Love Publishing.

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