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Educators’ beliefs about using academic acceleration with gifted math students and others: Barriers and opportunities

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EDUCATORS' BELIEFS ABOUT USING ACADEMIC ACCELERATION WITH GIFTED MATH STUDENTS AND OTHERS: BARRIERS AND OPPORTUNITIES

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Approval of Dissertation

We, the faculty supervising the work of Jason Gorgia, affirm that the dissertation, *Educators' Beliefs About Using Academic Acceleration with Gifted Math Students and Others: Barriers and Opportunities*, meets the high academic standards for original scholarship and creative work established by the EdD Program in Leadership Studies and the College of Education and Professional Development. The work also conforms to the requirements and formatting guidelines of Marshall University. With our signatures, we approve the manuscript for publication.

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Abstract

This study examined the perceptions of educators (i.e., math teachers, administrators, and others) for insight into the absence of acceleration as a common pedagogical strategy in mathematics, despite longstanding research supporting the practice for students gifted in math and the interest frequently articulated by policymakers and educators in boosting American K-12 students' math achievement. Educators from 48 states responded to scale-based and open-ended questions about math acceleration through an online survey where 713 of 818 respondents were teachers, balanced almost evenly among elementary, middle, and high schools, and among urban, suburban, and rural settings. The responses of teachers and non-teaching educators indicated a series of logistical and philosophical factors serving as barriers to acceleration, agreeing most often on seeing (1) philosophical opposition to acceleration on equity grounds, and (2) a school focus on struggling students. Open-ended responses endorsing more math acceleration were grounded in embracing the academic and social/emotional learning needs of advanced math students, while negatively worded responses were grounded mostly in the perceived emotions and relative standing of other non-accelerated students. Over 75% of educators supported math acceleration broadly defined to include "above-average" students. Educators generally supported the needs for math acceleration and for grouping gifted math students together, though some insisted on the typical same-age grouping for all found in our received age-grade factory model of education. This study was consistent with prior research advising that student learning would be vastly improved if schools aligned learning with students' readiness and vast diversity, rather than their individual ages.

Chapter 1

Introduction

The greatest structural failing of American K-12 schooling is the virtually universal segregation of students into age-based grade levels. A consequence of the factory model or industrial model of education that remains entrenched in the nation's schooling is a series of artificial age-grade communities of deeply questionable value (Pendarvis & Howley, 1996). These frequently create mismatches between the assumed levels of readiness of students based on their ages and their actual levels of readiness based on their developmental differences and diverse experiences. This asynchrony becomes increasingly manifest as students progressively diverge from age-based expectations.

For those students out of step with such expectations who are identified as low-performing/high-need, educational decision-makers at the federal, state, and district levels have directed significant resources to support their achievement. These decision-makers, however, simultaneously allocate almost no professional resources to students demonstrating achievement considered to be above grade level. From the U.S. Department of Education's "$637.70 Billion in budgetary resources" available for fiscal year 2022 (USAspending.gov, 2022), the federal contribution for gifted students was $14.5 million via the Jacob Javits Act (Cutler, 2022) grants supporting those from "traditionally underrepresented" groups (Office of Elementary and Secondary Education [OESE], 2022) and a "TALENT Act" permitting flexibility with already allocated Title I and Title II funds to address "gifted and high-ability learners" if desired (Congress.gov, 2022). This represents less than one-hundredth of one percent of the pool.

The first sentence of the U.S. Department of Education (ED) Fiscal Year 2023 Budget Summary (2022) quotes Secretary of Education Miguel Cardona: "Federal budgets are an expression of values" (p. 6). The overall budget request was a massive increase in discretionary spending of greater than 20% featuring notable and virtually across-the-board surges in funding. For example, the already robust assistance for Title I efforts more than doubled to over $36 billion. Meanwhile, even within this highly generous context, the budget managed to express values further by actually requesting a decrease in funding for the very modest Jacob Javits Act.

The "what gets measured, gets managed" idea is all too familiar to educators nationwide operating for a generation under professional reward systems that focus on moving low-performing students just past minimum competency. Data from the National Assessment of Educational Progress (NAEP) demonstrated that the performance of the top group of students under the assessment-laden No Child Left Behind Act (NCLB) had essentially stagnated (Loveless et al., 2008), while a concurrent survey of 900 public school teachers of grades 3-12 reported their own overlooking the academic needs of more advanced students to instead prioritize struggling students to help them reach proficiency in that era (Farkas & Duffett, 2008).

NCLB's immediate successor, the Every Student Succeeds Act (ESSA), exhibits some differences but manages to continue the testing tradition. The U.S. Department of Education (2018) touted that "ESSA requires every State to develop challenging academic standards…and to administer annual tests aligned with those standards" (p. 1). This leaves large numbers of students performing above grade level to receive low priority with curricula and concomitant assessments often poorly matched to these students' abilities.

In no domain is the range of performances wider than in mathematics, even in younger students. Data from across the country suggest that as many as 30% of elementary and middle school students score at least one full year above grade level in math, while 2-5% of students in fourth grade perform at least four years above grade level in math (DeFusco, 2016). The

National Commission on Excellence in Education's "A Nation at Risk" (1983) noted even an elementary student may know much of the year's curriculum before the school year even begins.

Such students would be much better served by the curricular match provided through the educational method of acceleration. Academic acceleration can be defined as the educational practices that allow students to access a curriculum earlier or proceed through it more quickly than their same-age peers usually do. Some examples include subject-matter acceleration, dual enrollment, early entry into a grade level or early exit from it, mentoring arrangements, grade-skipping, self-paced instruction, and Advanced Placement coursework. Southern and Jones (2015) have described 20 different methods of such acceleration.

The significant, uniformly positive academic effects of acceleration on learning have been detailed repeatedly in the research literature (e.g., Assouline et al., 2015; Benbow, 1998; Colangelo et al., 2004; Daurio, 1979; Hertzog & Chung, 2015; Howley et al., 2017; Kulik & Kulik, 1984; Park et al., 2013; Rogers, 2015). The research on multiple forms of acceleration also has described consistent success going back many decades (Addicott, 1930; Alltucker, 1924; Berg & Larsen, 1945; Birch & Reynolds, 1963; Brumbaugh, 1944; Elder, 1927; Elwell, 1958; Flesher, 1946; Herr, 1937; Hildreth et al., 1952; Hollingworth, 1939; Keys, 1938; Klausmeier, 1963; Lamson, 1930; McCandless, 1957; Morgan, 1957; Mosso, 1944; Pressey, 1944; Shouse, 1937; Silverman & Jones, 1932; Strabel, 1936; Terman, 1931; Thorndike, 1941; Unzicker, 1932; Wilkins, 1936; Wilson, 1949).

Similarly consistent findings exist on outcomes related to mental health or social-emotional domains (Cross et al., 2015). Steenbergen-Hu and Moon's (2011) meta-analysis found that accelerated students rated just as highly as non-accelerated peers on social-emotional measures. In fact, not a single study has found acceleration to generate any long-term negative effects in either mental health or academic measures (Benbow & Stanley, 1996). Bernstein et al. (2021) reported not only that the amount of acceleration did not covary with psychological well-being, but also that their participants' well-being rated above the national average. Further, Neihart (2007) found negative social-emotional outcomes only among students whose curriculum was not accelerated compared to accelerated, same-ability age peers.

When acceleration has been used in mathematics with students who demonstrate readiness for challenge beyond their current math experiences, the results have been especially positive. A notable amount of this research impetus historically has been conducted through the Study of Mathematically Precocious Youth (SMPY), disseminated originally by Julian Stanley (e.g., Stanley, 1977; Stanley & Stanley, 1986). Subsequent SMPY findings have continued to detail the routinely highly positive outcomes of acceleration in school and increasingly in adulthood through longitudinal study of cohorts (Kell & Lubinski, 2014; Lubinski & Benbow, 2006).

The manner in which American K-12 math curricula in particular are routinely organized into sequentially ordered grade-level standards and topics creates a rather favorable structure for the pursuit of acceleration as an educational method. Even the copious amounts of national rhetoric about meeting students' needs, however, especially in science, technology, engineering, and mathematics (STEM), in part due to the supposed importance of international economic competitiveness in current and future generations, still have not resulted in any significant implementation of acceleration in schooling nationwide.

For example, in absence of a significant federal role in terms of leadership or support for advanced students, state and local agencies become the best hopes for these students. Yet, the National Association for Gifted Children (NAGC) reported comprehensive survey results that fewer than a third of U.S. states provide both funding and a mandate for educational services for such students, simultaneously showing that "differentiation in the general education classroom" greatly outpaced acceleration as the most common district/school arrangement for advanced students from pre-K through eighth grade (Rinn et al., 2022). Advanced Placement (AP) was reported as the most frequent model in high school. The same document indicated that only 10 states even have an acceleration policy, and only nine states require "content-based acceleration."

The NAGC survey also showed that pre-service and in-service trainings on gifted students for American local education professionals were virtually nonexistent; only seven states mandated any such training of pre-service teachers, administrators, counselors, or special education professionals, with no more than four states listed per category, and with only one state training members of all groups. It remains unclear how these educators who work most closely with advanced students are made aware at any point of the research base supporting the consistently strong benefits of acceleration—if these educators even happen to work in a state that may offer modest acceleration options.

The primary commonality among the numerous adults involved in federal, state, and local education is that a critical mass has adopted a laissez-faire perspective toward the education of the country's most capable students—call it the "they'll be fine" approach. But the default, age-based structure of schooling within which these students are left to function remains particularly ill-suited for their developmental readiness. It is unsurprising, then, that many of them will not benefit from anything resembling acceleration until possibly taking AP courses in high school. Though acceleration is the very educational structure supported consistently in the research literature to facilitate the intellectual development in vital domains espoused by numerous policymaking voices, opportunities to employ these proven methods with students in schools remain particularly underutilized. It may be the case that educators, including teachers and administrators, hold the answers to why even the most obvious student candidates who would stand to benefit significantly from acceleration of their math curricula are typically not provided such opportunities in schooling.

Statement of Problem

Virtually all American K-12 schools are segregated by age. In those typical age-grade placements, grade-level curriculum standards enforce a unitary pace for student learning. Students across the country naturally exhibit a wide variability of performances, however, with students at both extremes most notably out-of-step with grade-level expectations. While educational resources are commonly directed to students who struggle to meet minimum standards, students demonstrating above-grade-level achievement are seen as success stories who do not require further interventions, as evidenced by a paucity of appropriate programming, training, and funding at all levels of the nation's educational apparatus.

This is especially problematic in mathematics, an academic domain where able students who may be interested in moving through topics and problems ahead of typical age-grade expectations are limited in class to grade-level math far below their capabilities, even very early in school. Students who remain in school environments asynchronous with their abilities and readiness are at risk for emotional maladjustment and for having their intellectual development greatly constrained (Gross, 2004). Those losses occur not only to students and their families, but also to the society through current and future STEM needs.

As referenced above, research consistently and strongly supports both the academic and social benefits of acceleration for capable students. Each of the types of acceleration enumerated by Southern and Jones (2015) matches students' readiness with moving through a curriculum earlier, in greater depth, and/or more quickly than typical grade-level constraints allow. Also as referenced above, reasonable concerns with potentially negative mental health aspects of acceleration are also entirely at odds with repeated, positive research findings on social-emotional outcomes resulting from acceleration (e.g., Bernstein et al., 2021).

The most common interventions for advanced students, however, are enrichment-oriented, which are supported only weakly in the research literature; these educational endeavors have long since called into question the utility and ethical defensibility of those interventions (Borland, 2003; Daurio, 1979; Howley et al., 2017; Maker, 1986; Margolin, 1996; Pendarvis & Howley, 1996; Sapon-Shevin, 1994).

While researchers have spoken essentially unanimously in support of all types of acceleration over decades of research on academic and social-emotional development, the implementation of such well-endorsed approaches has been relatively sparse. Little empirical work has been done, however, to examine potential reasons for the absence of the acceleration model in classrooms. It may be that those with more direct insights into the realities of the instructional day can shed light on that problem.

Purpose of the Study

The purpose of this study was to examine the perceptions of educators—including teachers, administrators, and others—in order to gain insight into the absence of acceleration in mathematics as an educational method, despite the very consistent body of research supporting it and the interest frequently articulated by educators and policymakers in boosting the achievement of American K-12 students in mathematics.

Soliciting the underreported perspectives of teachers and other educators regarding student grouping arrangements and students' academic/mental health needs may provide the essential link between a well-endorsed but largely unused educational approach and the richest opportunities for its optimal implementation that stand to benefit the lives of real students and their families.

Research Questions

In order to address the stated problem and to help achieve the study's purpose, the following questions were central to the research:

1. What are educators' beliefs about barriers to curricular acceleration for students who would benefit from it?
2. What are educators' beliefs about whether gifted math students' needs should include opportunities for curricular acceleration?
3. What are educators' beliefs about the most appropriate grouping arrangements for advanced math students?
4. What are educators' beliefs about the most appropriate curricular pace for advanced math students?
5. What are educators' beliefs about gaps between the current performance and the potential of gifted math students?

Method

This study featured a non-experimental, descriptive design. Data were gathered via the Qualtrics online survey software and used both scale-based and open-ended questions. This generated multiple sources of information in order to address the study's five main research questions.

Population

This study solicited the participation of teachers and other educators who serve students through additional roles (e.g., assistant principals, principals, curriculum directors, instructional coaches, counselors, etc.). These adults have worked in various settings such as elementary schools, middle schools, and/or high schools. The large majority of them were employed in the public school system.

A national sample was sought via the use of technology, including the use of social media and possibly including some school systems known to the researcher. The social media presences of professional associations served to connect with individuals involved in the education of children.

Limitations

The extent to which the study incorporated respondents who worked in environments similar to those of the researcher will limit the scope of any generalizability, instead resulting in more of a sample of convenience. This limitation could be relevant geographically, philosophically, and demographically. As such, a primary goal was to solicit the participation of as many individuals as possible to help create a more purposeful or quota-based non-random quantitative sample.

Another possible issue is that the researcher's extended professional background in relation to the study could be construed as potentially introducing bias that affects the interpretation of responses in the research, as opposed to being seen as bringing appropriate awareness of salient issues to enhance understanding. It may also be the case that participants could introduce their biases into the process through their responses to this non-experimental study.

Significance

The study can help elucidate the experiences and the philosophies of the teachers, administrators, and other educators whose actions and beliefs construct students' learning environments every day. A large body of uniformly positive research on acceleration over many decades has not resulted in its regular implementation in classrooms. It seems, then, that studies that seek to understand the relevant perspectives and daily logistical constraints of educators can help clarify where both barriers and opportunities may exist regarding the utilization of acceleration where appropriate with students.

Chapter 2

Literature Review

It is necessary to examine first the broader social and educational contexts within which this study is situated. Several factors intersect to provide insight into the nature of our most commonly accepted educational approaches, including prevailing social philosophies, conditions, priorities, and goals. These components help reveal the development of the structural deficiencies in the typical organization of our educational systems and their mismatches with the students whose needs often are not met within those systems. The consideration of this context, then, is an imperative first step toward recognizing more suitable educational alternatives for many students.

Anti-Intellectualism in Society

Anti-intellectualism in American public life has long since permeated the public schools that function within our society. In a classic text, Richard Hofstadter (1963) identified the "common strain" that unified fluctuating aspects of a deeply ingrained anti-intellectual national character as "a resentment and suspicion of the life of the mind and of those who are considered to represent it; and a disposition constantly to minimize the value of that life" (p. 7). He claimed that anti-intellectualism was such "a broadly diffused quality in our civilization" in part because it also could be "the incidental consequence of some other intention, often some justifiable intention," like "our passion for equality" and "egalitarian" educational philosophies (p. 22-23).

In a 1980 essay, Isaac Asimov as well decried the anti-intellectual "Don't trust the experts!" perspective of the many in American society who would slur "anyone who admires competence, knowledge, learning and skill, and who wishes to spread it around" as an "elitist." Asimov asserted its inveterate presence:

> There is a cult of ignorance in the United States, and there always has been. The strain of anti-intellectualism has been a constant thread winding its way through our political and cultural life, nurtured by the false notion that democracy means that "my ignorance is just as good as your knowledge." (p. 19)

Anti-Intellectualism in Schooling

It is then unsurprising that such a pervasive characteristic of American life would materialize in the nation's public schools. If "intellectual talent generates considerable ambivalence" (Benbow & Stanley, 1996, p. 258) through an eternal struggle between equality and excellence (e.g., Gardner, 1961), schooling that prioritizes optimal education for advanced students is most likely to occur during times of national concern, such as Sputnik's launch or the publication of federal reports that reproach the educational system (Colangelo & Davis, 2003). Where intellect can be defined, however, as making meaning from "the complexity of understanding, critique, and imagination of which the human mind is capable" (Howley et al., 2017, p. 5), the cyclical thrust for patriotic talent development constitutes an anti-intellectual "national resource argument … that what people know and are able to do helps account for international differences in productivity and 'competitiveness.' People, in short, exist to serve the national security interest … " (Howley et al., 1995, pp. 2-3).

Apple (1993) identified the burgeoning influence of a power bloc in educational and social policy that "aims at providing the educational conditions believed necessary … for increasing international competitiveness, profit, and discipline," characterized and enforced in part "through the implementation of statewide and national testing" and "the growing pressure to make the perceived needs of business and industry into the primary goals of the school" (p. 227). Within the schools, the context of the simultaneous "de-skilling" of teachers—typified by their being stripped of professional autonomy (Wong, 2006)—has had an unfortunately long history (Apple, 1987; Apple & Jungck, 1990). Many teachers have perpetuated or at least served the prevailing culture in this environment (Aronowitz & Giroux, 1985) with what modestly remains of their intellectual work. In this way, both traditionally conservative and liberal ideologies have participated in elevating above student intellect the narrow employment of education to instrumental ends that serve to further American economic interests (Apple, 1993; Howley et al., 1995).

Gatto (1995) pointed to the early 20th century as a time when America's powerful men were corporatizing independent farmers and entrepreneurs; simultaneously, and not accidentally, American schooling shifted away from developing the intellect and toward socialization—the source of the consequent stability and control desired. He added that the emotional safety of a pliable, predictable society is incompatible with an approach that facilitates meaningful intellectual development and eschews control. In this way, the most powerful individuals who venerate social control will insist on a "civilizing" educational system organized such that unpredictable intellect does not interfere. This results, Gatto asserted, in the dispossession of students' creativity, initiative, and flexibility, replacing them with indifference, passivity, and uniformity. Intellect loses again.

Dealing With Social Change

Many prominent individuals in public education in the mid-1800s, during the era of the common school movement (Spring, 1994), were influenced by the Prussian educational system (Gatto, 2001). Arguably the most preeminent, influential voice on this topic in that era belonged to Horace Mann, "the most famous educational reformer of the time" (Katz, 2001, p. 5). Katz (1987) noted Mann's "secular evangelism" (p. 49), writing "To Horace Mann educational reform was not a task or merely a necessity; it was—and this word permeates his published and unpublished writing—a 'cause'" (p. 49-50). Tyack and Cuban (1995) remarked that "In the 1840s Horace Mann took his audience to the edge of the precipice to see the social hell that lay before them if they did not achieve salvation through the common school" (p. 1).

Prussia had established State-funded public schools in order to inculcate the values of the dominant culture and to teach the speaking of High German "from a desire to homogenize linguistic variation as a maker of a unified State," where "[v]oice was not the expression of intra-national difference but the means of its quelching" (Baker, 1999, p. 368). Prussian schools were the engine to—literally and figuratively—control and create one national voice. After visiting Europe, Horace Mann was sufficiently moved to attempt to install the structure and goals of Prussian schooling in America, where in 1843, he specifically "extolled the virtues of Prussian graded schools" (Goodlad & Anderson, 1959, p. 48).

The style and content of Mann's advocacy found a sympathetic ear in an American public awash in that time's unprecedented social change and its resulting social anxiety (Katz, 2001). Surges in immigration, migration, mechanization, and urbanization created great insecurity in society, where many citizens were coming into contact with new people and encountering diverse examples of what Giroux (1983) calls "cultural capital"—namely, social assets and abilities, including language, arising from a person's socioeconomic position. Katz (1987) asserted that the "need to discipline an urban workforce intersected with the fear of crime and poverty and the anxiety about cultural diversity to hasten the establishment of public educational systems" (p. 19). These concerns impelled many to support the minimizing of the nation's schools' efforts at the "cultivation and the transmission of cognitive skills and intellectual abilities" in favor of an approach designed "to shape behavior and attitudes, alleviate social and family problems, and reinforce a social structure under stress. The character of pupils was a much greater concern than their minds" (p. 22-23).

Factory Model of Education

Colangelo et al. (2004) described how the individualized education characteristic of the locally controlled one-room schoolhouse began to give way, with the rise of corporatization and a "more collective and standardized" culture in young America, to "schools that grouped students according to age instead of by ability and motivation. This was not an educational decision. It was an organizational decision … [that] paralleled the American belief in the efficiency of the industrial model of organization" (p. 11). Those one-room schoolhouses increasingly were transformed into more uniform systems featuring standardized administration and centralized management (Tyack, 1974), as reflected in the bureaucratization evident in the escalating rationalization of the culture (Weber, 1921). Industrialists and other influential employers sought a free, trained, skilled workforce from waves of American migration and immigration, a significant driver of this burgeoning factory model of public schooling (Tyack, 1974), where the organization of schools eventually would "correspond" to the organization of the nation's workforce (Bowles & Gintis, 1976). An anxious public was complicit, supporting the progressive deprioritization of the individual student's intellectual development in exchange for the comforts of greater order and sameness.

Cuban (2008) explained that comparing education to a factory model, however, for over a century was not the insult that it has become more recently. Numerous progressive reformers over many decades enthusiastically advocated for the supposedly modern and forward-thinking elevation of efficiency as instantiated by age-graded schools. Leaders in education and business agreed upon the socialization goals like obedience emphasized in such schooling, generating mutually desired behavioral outcomes as a consequence of age-graded classrooms. He added that modern opinion polls of parents and voters routinely demonstrate that their desired goals for public schools easily can be categorized as social rather than intellectual.

Tyack and Cuban (1995) declared that assessing school quality and even its very purpose has become notably constricted compared to earlier times. Many of today's adults see the enduring, familiar structure of the age-graded school not only as "good," but also, in concert with the predominant business vision for schooling, as the "one best" system in which to educate all students (Cuban, 2003). Despite a long national history of alternative school structures and goals, including current examples, we have narrowed our conceptions of the purpose of schooling, thereby inhibiting our ability to facilitate the intellectual development of a historically diverse American student population. Cuban pleaded for flexibility in saying that "unequal treatment is essential for students whose needs differ greatly and vary in motivation, interests, aptitudes, and background" and for us to reckon with the "unchallenged dominance of the age-graded school," since even many educators "have assumed that the age-graded school is as natural as the sun rising and setting. It is not" (p. 45).

Gifted Students and Enrichment

Almost all American K-12 schools segregate students into classrooms based on age, where a unitary pace for student learning is enforced by pacing guides and grade-level curriculum standards. The students most likely to experience developmental asynchrony with these environments are those at one academic extreme or the other. Given the focus on prioritizing educational resources to those most likely to not reach minimum competency standards, the students who demonstrate above-grade-level achievement or are considered most likely to do so are at the greatest risk of being ignored and not having their educational needs met.

To the extent that attempts have been made to address these needs, the primary method of doing so has been through enrichment, even reaching back to previous decades. Most of this enrichment historically has come at the elementary level and in the form of part-time, "pull-out" programs—where students leave their regular class setting for some amount of weekly enrichment with other students—but empirical evidence supporting this approach remains virtually nonexistent (Borland, 2003; Shore et al., 1991). This popular pull-out model has long been known to be structurally insufficient to address students' needs (Cox et al., 1985). In fact, it also has been known for decades that no form of enrichment of any kind has demonstrated greater results compared to forms of acceleration (Daurio, 1979).

Moreover, inasmuch as enrichment programs and their usually qualitatively different curricula rest on the highly ethically questionable assumption that gifted students are supposedly qualitatively different (instead of quantitatively different) than their peers, profound philosophical concerns arise (Howley et al., 1995), including when the enrichment activities could be beneficial to all students (Borland, 1989). This raises issues regarding the academic and political viability of using enrichment as such a prevalent method with the most academically advanced students. It may be that enrichment endures as a common, convenient approach because it places little or no stress on the typical age-grade classroom structure.

The purpose here is to question the method, while looking for a better way to meet the needs of advanced students. For example, Sapon-Shevin (1994, 1996) claimed that addressing the different needs of such students constitutes a disruption of the classroom community. Pendarvis and Howley (1996) responded, however, with the following:

> It should be remembered that segregation by age and grade is an artificial community designed to improve the *efficiency* of schools … based on the model of schools as factories. … There is considerable question as to how beneficent such school "communities" really are. (pp. 222-223)

Gifted Students and Acceleration

In contrast to enrichment, the benefits of using acceleration with students have been demonstrated repeatedly. A century of research has uniformly supported the academic and social-emotional benefits of acceleration for students who are ready for it. One reasonably could conclude that any open-minded educators then and now would have been convinced of the value and need for acceleration in education just from the deluge of unfailingly positive outcomes of acceleration studies from Depression-era through postwar America (e.g., Addicott, 1930; Alltucker, 1924; Berg & Larsen, 1945; Birch & Reynolds, 1963; Brumbaugh, 1944; Elder, 1927; Elwell, 1958; Flesher, 1946; Herr, 1937; Hildreth et al., 1952; Hollingworth, 1939; Keys, 1938; Klausmeier, 1963; Lamson, 1930; McCandless, 1957; Morgan, 1957; Mosso, 1944; Pressey, 1944; Shouse, 1937; Silverman & Jones, 1932; Strabel, 1936; Terman, 1931; Thorndike, 1941; Unzicker, 1932; Wilkins, 1936; Wilson, 1949). More recent research on acceleration certainly has provided further corroboration of these conclusions (e.g., Benbow, 1998; Bernstein et al., 2021; Brewer & Landers, 2005; Daurio, 1979; Kulik, 2004; Kulik & Kulik, 1984; Rogers, 2004, 2015; Stanley & Benbow, 1982; Swiatek & Benbow, 1991).

Academic acceleration can be defined as educational practices allowing students to access a curriculum earlier or proceed through it more quickly than their same-age peers. In the more striking instances, this can take the form of grade-based acceleration, which Rogers (2004) characterized as spending fewer years than typical in K-12 through a version of whole-grade acceleration usually more informally called "grade-skipping." Whole-grade acceleration is one of the many versions of academic acceleration that has shown strong, positive outcomes with students in need of more academic challenge (Colangelo et al., 2004; Lupkowski-Shoplik et al., 2015).

Whole-grade acceleration encompasses the research findings on early entrance to school (Gross, 1999; McCluskey et al., 1996; Proctor et al., 1988) and on early entrance to college (Brody & Muratori, 2015; Brody et al., 2004; Brody & Stanley, 1991; Janos et al., 1989; Muratori et al., 2003; Stanley & Benbow, 1983). Wells et al. (2009) used national datasets of nearly 25,000 students to estimate that about one percent of students across the country experienced grade-skipping or began kindergarten/first grade early. This pales to the varying estimates of 3.5% to 7% of American students who are "redshirted"—namely, those old enough to enroll in school but whose parents hold them out an extra year (Hansen, 2016; Huang, 2015; Sands et al., 2021).

The decision about whether a student would benefit from whole-grade acceleration can be formalized with the help of a validated instrument such as the Iowa Acceleration Scale, 3rd edition (Assouline et al., 2009). Having a systematized approach to what can be an emotionally charged topic with educators and parents (Colangelo et al., 2004) greatly aids the decision-making process, incorporating different categories of assessment data and the opinions of multiple stakeholders (Lupkowski-Shoplik et al., 2015). Some students benefit from multiple years of acceleration, possibly all at once or sometimes spread out over a longer period, also with documented success (Gross, 2004, 2006; Jung & Gross, 2015).

Accelerating the curriculum in a more targeted way, especially where a student may exhibit strength in one particular domain, is a "subject-based" or "content-based" approach that also has found consistent success (Kolitch & Brody, 1992; VanTassel-Baska & Johnsen, 2015). This can prove to be a defensible approach if a student does not need greater challenge in most or all subjects, as opposed to students who require whole-grade acceleration.

Students in special circumstances benefiting from acceleration include those exhibiting one or more disabilities in addition to being very academically able (Silverman, 2003), often labeled "twice-exceptional," where acceleration can help overcome the frequent focus on more deficit-based educational challenges that many such students face (Foley-Nicpon & Cederberg, 2015; Moon & Reis, 2004). Some students may attend special schools to benefit from environments where an accelerated curriculum can be accessed (Benbow & Stanley, 1996; Kolloff, 2003; McHugh, 2006; Roberts & Alderdice, 2015).

Likely more surprising to some, the research literature also demonstrates positive gains in the social-emotional realm for students who participate in acceleration (Cross et al., 2015; Gross, 1993; Richardson & Benbow, 1990; Robinson, 2004). Students who have been accelerated report more long-term professional satisfaction (McClarty, 2015a, 2015b) and more positive long-term effects in general (Lubinski, 2004; Wai, 2015).

Even decades ago, Borland (1989) declared,

> Acceleration is one of the most curious phenomena in the field of education. I can think of no other issue in which there is such a gulf between what research has revealed and what most practitioners believe. The research on acceleration is so uniformly positive, the benefits of appropriate acceleration so unequivocal, that it is difficult to see how an educator could oppose it. (p. 185)

Acceleration's curious lack of implementation in American schooling, however, left Colangelo et al. (2004) to say, " … we are not aware of any other educational practice that is so well researched, yet so rarely implemented" (p. 11).

Benbow and Stanley (1996) summarized their perspective thusly:

> … acceleration is really a misnomer. Acceleration of talented students is not pushing the child along but responding to an existing advancement. It is simply deciding that competence rather than age should be the determining factor for when an individual obtains access to particular curricula or experiences. This is precisely what we do in the arts and athletics. Why not academics? (p. 275)

In opposition to this viewpoint and to the research on acceleration, however, education administrators often enforce "a limit on subject areas to be considered for accelerative practices" and, even when permitting any acceleration, believe "the rate should be capped at six months or a year so as not to allow students to get too out of step with the school curriculum or other students their age" (VanTassel-Baska, 2003, p. 176). The Procrustean age-grade bed remains the omnipresent context for educational decisions ostensibly in the best interests of students' readiness and development.

So Why Not More Acceleration?

The age-graded, factory model of education developed comfortably within the context of America's greater interest in social outcomes than intellectual ones. Acceleration is in more direct conflict with this enduring age-graded structure than enrichment is, which could explain the resilience of the enrichment approach—relatively popular despite its dearth of research support.

Schools inevitably reflect the same ills that plague the society within which these schools function; identifying students for academically advanced opportunities has been no exception. Critics have called for different identification procedures or the outright elimination of gifted programs due to the underrepresentation of African American, Hispanic, and lower-income students of all backgrounds in those programs. Some educators may agree philosophically with these advocates that identification procedures are hopelessly entangled with racism and classism, weakening support for even defensible interventions with students.

One also certainly could anticipate logistical and financial concerns from educators to explain why schools could not or should not use acceleration more often. It is challenging for teachers to meet the needs of their most precocious and able students within the context of typically age-grouped classrooms, especially with large class sizes, mandated programs of studies, and pacing guides that impose a single rate and type of coverage of standards. Administrators may be deploying their human resources as best as they can within the current structure of schooling.

What Do Educators Believe?

It is reasonable to expect educators to have differing priorities and challenges depending on factors such as their individual daily roles in schooling and the characteristics of the students with whom they work regularly. It would help to be aware of educators' beliefs about potentially utilizing various methods of acceleration with students who would benefit, as part of providing a socially just, fully appropriate education for all students. This motivates the present research study.

Chapter 3

Research Methods

The purpose of this study was to examine the beliefs of educators—including teachers, administrators, and others—regarding the acceleration of academic curricula for students, particularly in terms of mathematics. Consideration of these beliefs can help illuminate barriers preventing more widespread implementation of research-supported forms of acceleration, as well as possible opportunities to overcome those barriers in order to facilitate student success. This chapter describes how the study was executed and includes the following sections: research questions, research design, population/sample, and data collection/analysis.

Research Questions

In order to explore selected educators' perceptions of acceleration, these questions were essential to the research:

1. What are educators' beliefs about barriers to curricular acceleration for students who would benefit from it?
2. What are educators' beliefs about whether gifted math students' needs should include opportunities for curricular acceleration?
3. What are educators' beliefs about the most appropriate grouping arrangements for advanced math students?
4. What are educators' beliefs about the most appropriate curricular pace for advanced math students?
5. What are educators' beliefs about gaps between the current performance and the potential of gifted math students?

Research Design

This study featured a non-experimental, descriptive design. Data were gathered via a researcher-designed instrument that used the Qualtrics online survey software. The 20-item Qualtrics survey was created to capture educators' beliefs about acceleration in multiple ways including its relationship to relevant subtopics embedded in the five research questions. Both scale-based and open-ended questions were incorporated, some of which required the ranking of choices.

These different types of questions were used to ascertain educators' perceptions as precisely as possible. The goal was to generate diverse types of answers in order to address the research questions fully. The data were analyzed with SPSS Statistics 29 using both descriptive and inferential statistical operations. Demographic information was captured as well, in order to explore how these personal attributes may have been related to participants' belief systems and experiences.

The researcher made available the link to the Qualtrics survey and alerted relevant groups and individuals online, both directly and indirectly. Information pointing potential respondents to the survey, including reminders, was made available through social media and email communication.

Population/Sample

This study solicited the participation of teachers and other educators who also serve students (e.g., assistant principals, principals, curriculum directors, instructional coaches, counselors, etc.). Members of this population have worked on behalf of students in elementary school, middle school, and/or high school.

A sample of national scope was pursued through technological avenues, including the use of social media and possibly involving some school systems known to the researcher. The social media presences of professional associations additionally served as sources of connecting with individuals directly involved in the education of children.

Data Collection/Analysis

Participants' responses to the scale-based questions and to the open-ended questions in the online survey were stored automatically in the Qualtrics database. Each of the five research questions was addressed from different angles through the survey questions. The survey remained open for about four weeks in order to provide opportunities for the potential participation of educators.

After data were cleaned and organized, SPSS analysis proceeded. Open-ended responses were examined for overarching themes that emerged. Demographic characteristics were analyzed to consider the extent to which they may have related to beliefs of teachers and other educators. Descriptive statistics such as measures of central tendency were utilized where appropriate.

Limitations

Generalizability remains an issue in studies like this, including possible issues of scope and balance regarding demographics, geography, personal philosophy, and overall background. This study's findings were best limited to the stated perceptions of survey respondents in various domains of education versus the larger population of such groups.

Non-experimental research studies like these do not incorporate random assignment to groups for any manipulation of independent variables (Johnson & Christensen, 2000). Soliciting the participation of as many people as possible may have helped move toward a more purposeful or quota-based, non-random quantitative sample, as opposed to a sample of convenience where respondents were more likely to have worked in districts similar to those in which the researcher worked.

Potential bias is always a concern as well. The professional background of the researcher always can be viewed either as a source of empathy and experience to help elicit and understand participants' perceptions effectively or as a possible source of bias influencing the interpretation of responses in this non-experimental study.

Significance

Many students across the country and their families are not allowed to benefit from academic acceleration, despite a century of consistent research support. For generations, educators have elevated the study (and evaluation) of mathematics in schools yet rarely have implemented methods of acceleration where students demonstrate the most powerful outcomes. Typically, students instead remain taking coursework in systems which actively or passively limit instruction predicated on the age-grade expectations and goals commonly implemented in our received factory model of public education.

Given recent attention to Covid learning loss in students who already struggled, educators have deprioritized the needs of the many students who require greater academic challenge more than ever. Understanding the philosophies and perceived constraints of educators in terms of potentially implementing acceleration where appropriate can facilitate the essential work of serving the diverse academic and affective needs of all students.

Chapter 4

Results

As noted in the previous chapter, this study's purpose was to consider the beliefs of educators—both teachers and non-teachers—in terms of the acceleration of academic curricula for students, especially as it pertains to math. Using social media to advertise the Qualtrics survey's availability to such educators displayed both the possibilities and challenges of modern communication. Over 4,000 responses came in during the open survey window, but over 3,000 of those responses were eliminated based upon the following criteria: answering three or fewer questions overall, completing the survey in less than 100 seconds, and responding with inappropriately large numbers (e.g., for days of professional development). In addition, multiple responses sharing an IP address were omitted with consideration to latitude/longitude, timestamps, duration, and identical or significantly identical answers.

Sample

A still sizable group of 818 remained, representing all 50 U.S. states except Montana and Wyoming. Educators including teachers, principals, assistant principals, and counselors responded. Those who answered the survey "primarily as a teacher" represented 713 of the 818. Percentages were almost evenly split among those with experience in elementary school, middle school, and high school; totals summed to over 100% due to those who worked in multiple settings.

At some point in their careers, 46% of these educators reported having worked in a rural setting, 51% did so in a suburban setting, and 57% had worked before in an urban setting. In each of these three settings, the overwhelming majority reported from one to 10 years of experience, leaning in each case toward the higher half of the range. When asked for their most recent year of teaching, 63% of teachers provided a year from 2021 through the present.

The data were entered into SPSS v29 and findings will be reported by research question. Measures of central tendency will be addressed first, followed by any significant findings from a series of independent samples *t*-tests based on the demographic attributes of the sample.

Research Question 1

What are educators' beliefs about barriers to curricular acceleration for students who would benefit from it?

Survey statement #6 was the first to address this, posing, "Regardless of any academic benefits, I would expect to find drawbacks in terms of social/emotional well-being in the research on acceleration with students." All statements like this on the survey used a four-point Likert scale where four was "strongly agree," three was "somewhat agree," two was "somewhat disagree," and one was "strongly disagree." With n = 809 results displayed in Table 1, the mean of 2.91 is very close to "somewhat agree" (SD = .807).

Table 1

Descriptives for Survey Statement #6

Statement	*n*	*M*	*SD*
Social/emotional drawbacks	809	2.91	.807

Survey statement #8 was, "Even if arranging students by ability were beneficial to some groups, it would create negative self-esteem effects for the lowest-performing groups." A level of agreement similar to statement #6 was demonstrated from n = 797 respondents (M = 2.94, SD = .805), as can be seen in Table 2.

Table 2

Descriptives for Survey Statement #8

Statement	*n*	*M*	*SD*
Negative self-esteem effects	797	2.94	.805

Survey statement #9 said, “Using acceleration with some students disrupts classroom communities, since it isn’t fair to students who do not have accelerated coursework.” The n = 767 respondents did not support this negatively worded statement as strongly as the previous two survey questions (M = 2.61) and spread out their answers more than on the other Likert-scale questions (SD = 1.016). This was the only question that returned an overall standard deviation of greater than 1.

Table 3

Descriptives for Survey Statement #9

Statement	*n*	*M*	*SD*
Disrupts classroom communities	767	2.61	1.016

Survey question #14 provided a dozen choices from which respondents could select as many responses as desired to the question “Which factors make it less likely that accelerated math coursework will be offered to classes or to individual students?” Slightly different wording was necessary for a few of the choices in order to account for the different professional vantage points of working inside the classroom compared to outside the classroom. Therefore, those who earlier selected that they were “taking this survey primarily as a teacher” received the appropriately worded reasons, as did those who originally chose to answer “primarily as another educator." A virtual four-way tie emerged among the most frequently cited factors by the 713 teachers. The top six reasons are listed in Table 4.

Table 4

Teachers: Barriers to Accelerated Math

Reason	*n*
Conflicts with the master schedule.	229
There is something unfair … I have some philosophical opposition.	225
We focus resources on struggling learners instead.	224
The needs of the students I know are met already in their non-accelerated math.	221
Any wide range of student ability in a class.	189
Hiring staff/using current staff to teach accelerated math is difficult.	150

The other 102 educators, not based in the classroom, cited many of the same factors for survey question #14, but often in different order, as displayed in Table 5.

Table 5

Non-Teacher Educators: Barriers to Accelerated Math

Reason	*n*
Any wide range of student ability in a class.	42
There is something unfair … I have some philosophical opposition.	37
Hiring staff/using current staff to teach accelerated math is difficult.	34
We focus resources on struggling learners instead.	31
Prefer to use enrichment and move through curriculum at the usual rate.	29
Conflicts with the master schedule.	26

Both the teachers and the non-teachers had the opportunity on survey question #15 to rank the importance of the choices they provided to survey question #14, corroborating the relative importance of the factors each group respectively noted.

The wording for open-ended survey question #17 differed somewhat depending on whether educators identified themselves primarily as teachers at the beginning of the survey. For teachers, survey question #17 read, "If a teacher-led effort to incorporate an accelerated curriculum for gifted math students in your school put those teachers out of step with what other teachers of the same grade or subject were doing, how would your administrators and peers respond?" For the other non-teaching educators, it read, "How would you respond to a teacher-led effort to use an accelerated curriculum for gifted math students in your school, if doing so put those teachers out of step with what other teachers of the same grade or subject were doing?"

Responses to those questions were classified as positive, negative, neutral, or unclear. The non-teacher group answered in a nearly uniformly positive manner, giving 23 positive responses (almost a quarter of the non-teacher sample) juxtaposed with only five negative responses and one neutral response, as demonstrated in Table 6. Teachers expected administrators and peers to react more ambiguously, providing 54 positive, 22 negative, and 47 neutral responses.

Table 6

Responses to Survey Question #17

Educators	Positive	Negative	Neutral
Teachers	54	22	47
Non-teachers	23	5	1

Among the positive teacher responses were observations such as these, anticipating support from their colleagues:

- "My colleagues would very much approve."
- "They would likely want to know that all of the standards were still being addressed, but otherwise would be fine."
- "My administrator and colleagues would be mostly in support of this approach."

Other teachers, however, felt they would lack the necessary support:

- "Administration in my district would not be supportive and would find any multitude of reasons to make up to make sure it does not happen."
- "I currently teach an accelerated math analysis class. There has been a push from NCTM to stop differentiated courses. We have not been backed in trying to get additional acceleration going."
- "Admin and peers want everyone teaching the same thing at the same time. They say they want us to differentiate and meet the needs of our gifted learners, but their actions and expectations say differently."
- "Like trying to get out of a crab bucket."

The neutral responses were almost exclusively non-committal, such as "I think some would be okay with it and others would not."

As reported in Table 6, the non-teaching respondents were far more likely to be positive regarding a teacher-led effort to use an accelerated curriculum for gifted math students. Among the representative responses were these:

- "If it met the needs of the students and there was data to support that it was working for all students then I would be supportive."

- “I would encourage teachers to meet the needs of students in their classes. Exploring ways to provide for all students is important.”
- “We are trying to reach and teach to all students’ potentials. It is not equitable to teach to the middle as the gifted then are technically left behind.”
- “Why would we want all the teachers to be in the same step? That doesn’t make sense to me. Equity, not equality.”

Among the few negative replies ($n = 5$), the potential for unfairness tended to dominate:

- “I will not use accelerated courses, which is unfair to other students.”
- “I don’t recommend using accelerated courses, because it is unfair to a few ordinary students.”
- “I would not feel comfortable with that because all stakeholders may feel overwhelmed and stressed out.”

Survey question #19 asked, “Would you support an increased use of math acceleration in schools?” Positive answers ($n = 215$) outnumbered negative answers ($n = 57$) by a nearly 4:1 ratio among both groups—the teaching respondents and the non-teaching respondents. Three main themes emerged from the positive responses in Table 7, regarding acceleration’s being an appropriate challenge ($n = 97$), maintaining student engagement and motivation ($n = 32$), and a need for faster pacing ($n = 29$).

Table 7

Themes for Survey Question #19: Teaching and Non-Teaching Respondents

“Yes” Themes	*n*
Appropriate challenge	97
Maintaining student engagement and motivation	32
Need for faster pacing	29

Those who supported an increase in acceleration tended to focus on the benefits of challenging students:

- "Provide more challenging learning opportunities."
- "Accelerated programs can provide a more challenging learning environment for able students, helping them develop their math skills and talents."
- "Yes because I have seen the benefits in my own children's school experience when they were properly challenged in math."

Student engagement and motivation were also frequently mentioned:

- "If gifted students are not challenged enough in ordinary courses, they may become bored and disappointed, and may even lead to a decline in interest in learning."
- "Giving gifted math students the chance to accelerate helps them to stay motivated and interested in learning."
- "As an educator of gifted students, I've seen first-hand how frustrated students get when the content feels too easy."

Respondents were also quite clear on the benefits of faster pacing:

- "By accelerating the math curriculum, students who have demonstrated advanced abilities in mathematics can progress at a pace that matches their capabilities."
- "We have some that should be accelerated even more."
- "Yes, all students learn at different rates and we can't expect students to stay stagnant while all other learners are being catered to."

Table 8 reflects three different themes that emerged from negatively worded responses, again grounded in ideas of equity and fairness (*n* = 17), concern with the pressure for some to keep up ($n = 17$), and unease with potentially widening learning gaps between groups of students ($n = 6$).

Table 8

Themes for Survey Question #19

"No" Themes	*n*
Equity/fairness	17
Challenges with "keeping up"	17
Widening learning gaps between groups of students	6

As demonstrated in the table above, equity concerns were quite common:

- "No. Equity and representation are lost."
- "No support, will cause inequality between students."
- "No, because it is unfair to some ordinary students. I hope to treat everyone equally."

Those who worried about other students' "keeping up" offered these kinds of observations:

- "Other students may not be able to keep up or feel marginalized."
- "I don't support it very much. There are some students who can't keep up."

Among the comments on learning gaps were these:

- "Gifted students may further widen the gap with other students in mathematics."
- "The use of mathematical acceleration courses may lead to widening learning gaps."

The salient demographic feature of the sample turned out to be whether a person answered the survey as a teacher or as any other type of non-teaching educator. The distinction between these two groups produced significant findings for each of the following four research questions.

Research Question 2

What are educators' beliefs about whether gifted math students' needs should include opportunities for curricular acceleration?

Survey statement #1 posited, "Within each grade, our students demonstrate different levels of readiness for advanced math material." Table 9 displays the $n = 815$ respondents' agreement with the highest overall score on this section of the survey ($M = 3.14$ on the 4-point scale, $SD = .807$).

Table 9

Descriptives for Survey Statement #1

Statement	*n*	*M*	*SD*
Different levels of readiness for advanced math	815	3.14	.807

Survey statement #3, on the other hand, produced one of the two lowest means ($M = 2.63$) and largest standard deviations ($SD = .921$) in response to "Gifted math students are doing fine overall and therefore don't need special modifications to their curriculum," seen in Table 10.

Table 10

Descriptives for Survey Statement #3

Statement	*n*	*M*	*SD*
Don't need special modifications to curriculum	813	2.63	.921

As can be seen in Table 11, teachers were more likely to assign higher ratings on this statement ($M = 2.70$, $SD = .904$) than non-teachers ($M = 2.17$, $SD = .904$), whose scores trended toward "somewhat disagree." On an independent samples *t*-test, this represented a significant effect for type of educator—teacher vs. non-teacher—at the $p < .001$ level.

Table 11

Descriptives for Survey Statement #3: t-test for Equality of Means

	Teacher		Non-teacher		*t*	*p*
	M	*SD*	*M*	*SD*		
Doing fine	2.70	.904	2.17	.904	5.34	<.001

Survey question #11 asked, "Which math students would benefit from accelerated exposure to math?" Respondents could select all that applied from five groups of math students: gifted, above-average, average, below-average, lowest-performing. Nearly 70% (n = 567) of all educators thought that gifted students would benefit from acceleration in math, but an even greater number (n = 617) representing over 75% felt that above-average students would benefit from this acceleration, as reported in Table 12.

Table 12

Groups Seen to Benefit From Acceleration

Student group	%	*n*
Gifted	69	567
Above-average	75	617
Average	25	207
Below-average	11	89
Lowest-performing	5	37

It could be the case that since gifted students seem most likely to be identified for enrollment in accelerated math opportunities, some respondents felt that gifted students already were benefiting and did not need new opportunities. It may also be that some respondents believe the best option is to provide acceleration for students performing at least at the above-average level, also including the top students. Regardless, the support for accelerated math drops off significantly and continuously beginning with students labeled as average, for whom 25% (*n* = 207) of all educators endorsed accelerated exposure to mathematics.

Survey question #13 also asked, "In which grade ranges can math acceleration be appropriate for some students? Select all that apply: K-2; 3-5; 6-8; 9-10; 11-12." Some of the earlier general support for acceleration seemed to be diffused across grade levels in Table 13; the largest support for any of the five grade ranges was the 43% of all educators (*n* = 350) who felt middle school was an appropriate time for acceleration for at least some students. Grades 9-10 was the next most popular range at 35% (*n* = 289), with 27% supporting grades 3-5 and 11-12.

Table 13

Grades Appropriate for Acceleration

Grade ranges	K-2	3-5	6-8	9-10	11-12
% agreed	11	27	43	35	27

Research Question 3

What are educators' beliefs about the most appropriate grouping arrangements for advanced math students?

Survey statement #2 read, "Teachers can fully meet the needs of all students in a mixed-ability classroom—including gifted math students—by differentiating the curriculum." There was support for this sometimes controversial practice in the survey (*M* = 3.05 on the 4-point scale, *SD* = .804) from *n* = 808 educators, as displayed in Table 14.

Table 14

Descriptives for Survey Statement #2

Statement	*n*	*M*	*SD*
Differentiating the curriculum	808	3.05	.804

Teachers were significantly more likely to endorse this perspective than were non-teachers (*M* = 2.77, *SD* = .922), as demonstrated through an independent samples *t*-test shown in Table 15.

Table 15

Descriptives for Survey Statement #2: t-test for Equality of Means

	Teacher		Non-teacher		*t*	*p*
	M	*SD*	*M*	*SD*		
Differentiate	3.10	.777	2.77	.922	3.66	<.001

Survey statement #4 posited, "Gifted math students benefit academically from learning together in the same math class with each other." Though statements #2 and #4 could be seen as contradictory to each other, Table 16 shows that statement #4 received a score (*M* = 3.01, *SD* = .797) from *n* = 812 educators, similar to the score that statement #2 received (*M* = 3.05, *SD* = .804).

Table 16

Descriptives for Survey Statement #4

Statement	*n*	*M*	*SD*
Gifted together in the same math class	812	3.01	.797

Survey statement #5 was, "Gifted math students benefit socially/emotionally from being taught together in the same math class with each other." As demonstrated in Table 17, this statement received almost the same amount of support from *n* = 806 educators (*M* = 2.94, *SD* = .791) as did the previous two questions. As mentioned earlier, a 3 on this scale was equivalent to "somewhat agree."

Table 17

Descriptives for Survey Statement #5

Statement	*n*	*M*	*SD*
Gifted benefit socially/emotionally together	806	2.94	.791

Survey statement #7 offered, "To provide effective math acceleration, schools should prioritize grouping math students by their readiness for advanced math content as opposed to their ages or grade levels." This statement scored very similarly to the previous statement in this category (i.e., #5: gifted math students benefit socially/emotionally from being taught together) from $n = 803$ educators ($M = 2.96$, $SD = .798$), as displayed in Table 18.

Table 18

Descriptives for Survey Statement #7

Statement	*n*	*M*	*SD*
Math grouping by readiness not age/grade	803	2.96	.798

Open-ended survey question #16 asked, "Should gifted math students have math class together, or should they be spread out in different math classes with everyone else?" The number of those answering that such students should learn together ($n = 190$) more than doubled the number of those saying they should not ($n = 84$).

Three main themes emerged from the "together" responses: the learning needs of advanced students ($n = 105$, representing about 13% of everyone in the survey); those students' social/emotional needs ($n = 33$); and their need for intellectual collaboration ($n = 33$), as reported in Table 19.

Table 19

Themes for Survey Question #16

Gifted Students Learning Together Themes	*n*
Learning needs	105
Social/emotional needs	33
Need for intellectual collaboration	33

Regarding gifted students' particular learning needs, one respondent offered, "It makes sense to put them together so they are not unchallenged waiting for peers less adept in math to catch up. Excessive repetition can be excruciating for gifted students." Another argued that "taking math classes together can provide a higher level of content and learning opportunities. If they are in a different math class with other students, they may be limited by the pace of the class." A third participant described this approach as providing "a more challenging and in-depth learning environment, stimulating students' creativity and problem-solving skills."

In terms of social/emotional needs, respondents discussed how grouping gifted students together can support their growth and development:

- "Being in a class of gifted math students promotes a growth mindset and resilience."
- "Gifted math students should have math class together to create a supportive environment where they can freely express their mathematical abilities without feeling judged or out of place."
- "Being in a class with other gifted students can provide a sense of belonging and reduce feelings of social isolation."

Regarding these students' opportunities to collaborate intellectually, one respondent noted that "among students who are also mathematically gifted, they can have more in-depth discussions and solve more complex mathematical problems together." A second agreed, observing that "students can engage in higher-level discussions, collaborate on complex problem-solving, and learn from one another."

Three additional themes emerged from the "spread out" responses, listed in Table 20: a desired role for gifted students as tutors/learning models for all other students (*n* = 29); prioritization of socialization with age peers (*n* = 26); and a continuing concern with equity and general unfairness (*n* = 14).

Table 20

Themes for Survey Question #16

Gifted Students Spread Out Among Peers Themes	*n*
Gifted as tutors/learning models	29
Socialization with age peers	26
Equity/unfairness	14

On the subject of gifted students serving as tutors/learning models, one respondent suggested that gifted students' "hav[ing] classes with other people, so that students who are talented in math can help tutor other students who are not so talented in math" would be mutually beneficial, with another agreeing that "when gifted math students are spread out, they may have the opportunity to assist and tutor their peers who may require additional support." A third characterized the arrangement as a way to "encourage cooperative learning, peer tutoring, and mutual support within the classroom."

Responses about the benefits of socialization with age peers were similarly focused on the mutually beneficial relationships that can develop:

- “Students can teach their peers who are struggling in a kid language different than adults which adds to their leadership skills.”
- “Studying with other students also promotes the ability to cooperate and work in teams … avoiding [*sic*] students from focusing too much on mathematics at the expense of other subjects.”
- “Spread out because the gifted students can learn just as much from their peers as they can from their gifted peers.”

Most of the participant observations about the potential inequities that may occur when gifted students are distributed across classrooms rather than clustered in a single one were straightforward. Some, however, implied a sense of frustration, if not anger or sarcasm. One noted, for instance, that “[i]t is indeed unfair if the actions of these students disrupt the entire classroom community,” while another wrote, “Spread out with everyone else. What does ‘gifted math students’ mean? How are we defining that? Aren’t all students brilliant?”

Research Question 4

What are educators’ beliefs about the most appropriate curricular pace for advanced math students?

Survey question #10 is the one that most directly addressed the issue of classroom pace, using the same 4-point Likert scale ranging from strongly disagree (1) to strongly agree (4). It said, “The typical regular math class is taught at the right pace for

gifted math students

above-average math students

average math students

below-average math students

lowest-performing math students."

The strongest level of support for any of the five groups was for average math students ($M = 2.76$, $SD = .985$), with $n = 763$ educators (both teaching and non-teaching) overall answering more closely to "somewhat agree" than to "somewhat disagree" regarding whether math classes are typically well-paced for average students.

The next highest level of agreement with the statement was for above-average math students ($M = 2.65$, $SD = .931$), although the mean for even this group moved closer toward a score halfway between agreement and disagreement on the scale. As shown in Table 21, the level of agreement continued dropping for the idea of pacing's being appropriate for below-average math students ($M = 2.63$, $SD = .991$) and, with a standard deviation of greater than 1, for gifted math students ($M = 2.63$, $SD = 1.015$). Pacing was seen as least well-suited for the lowest-performing math students, again with a notable standard deviation ($M = 2.52$, $SD = 1.024$).

Table 21

Descriptives for Survey Statement #10

Student group	*M*	*SD*
Gifted	2.63	1.015
Above-average	2.65	0.931
Average	2.76	0.985
Below-average	2.63	0.991
Lowest-performing	2.52	1.024

Statistically significant differences emerged on an independent samples *t*-test ($p < .01$) over appropriate pacing for "average math students" between teachers ($M = 2.75$, $SD = .986$) and non-teachers ($M = 3.01$, $SD = .834$). In Table 22, teachers were less likely to agree that the typical math class proceeds at the “right pace” for students performing at that level, compared to the group of non-teaching educators whose mean reached the “somewhat agree” level overall.

Table 22

Descriptives for Survey Statement #10: t-test for Equality of Means

	Teacher		Non-teacher		*t*	*p*
	M	*SD*	*M*	*SD*		
Right pace	2.75	.986	3.01	.834	-2.63	.005

The final survey question, #20, was a catch-all question that solicited any final experiences and thoughts about issues relevant to the research topic. Respondents contributed very solidly throughout the survey, including on the other open-ended questions, and the submissions to this question overall did not significantly add to the information the respondents had already contributed. For this reason, even though this question was constructed to provide opportunities to address issues like pace, it was decided not to incorporate the responses to #20 into the analysis.

Research Question 5

What are educators’ beliefs about gaps between the current performance and the potential of gifted math students?

Survey item #12 asked, “Which of the following terms best describes the gap between potential math learning and actual math learning for” both “gifted math students in a grade-level curriculum” and “gifted math students in an accelerated curriculum.” Response options were none, small, medium, large, and very large, and the n = 760 educators responding to the first group (i.e., gifted students in a grade-level curriculum) most often cited a “medium”-sized gap (n

= 290). That response was followed by belief in a "large" gap (*n* = 219) and then for a "very large" gap (*n* = 164). Only 11% of the educators selected "none" or "small."

Maybe surprisingly for the second group (i.e., gifted students in an accelerated curriculum), the *n* = 761 educators were even more likely to characterize the gap between potential and actual learning as being "large" (*n* = 244) or "very large" (*n* = 168), together representing the majority of the responses. This may indicate that some educators were emphasizing the greater possibilities and fewer limitations for such students in an accelerated curriculum rather than a belief in less actual learning among such students in this type of curriculum. The numbers in Table 23 represent each choice's percentage of overall representation for that curriculum (7% of the educators did not answer for either of the two curricula).

Table 23

Description of Gap in Math Learning by %

Curriculum	None	Small	Medium	Large	Very large
Grade-level	2	9	36	27	20
Accelerated	2	11	30	30	21

Numerical scores ranged from "none" being scored as 1 to "very large" scored as 5. As seen in Table 24, teachers characterized the gap between potential and actual math learning in a grade-level curriculum as being wider (*M* = 3.64, *SD* = .983) than non-teachers did (*M* = 3.22, *SD* = 1.000). Yet another significant effect, this time at the $p < .001$ level, was found on an independent samples *t*-test for type of educator—teachers compared with other non-teacher educators.

Table 24

Descriptives for Survey Statement #12: t-test for Equality of Means

	Teacher		Non-teacher		*t*	*p*
	M	*SD*	*M*	*SD*		
Grade-level	3.64	.983	3.22	1.000	3.59	<.001

An additional effect for type of educator was found in an independent samples *t*-test when comparing the means in Table 25. Like their responses about the grade-level curriculum, non-teachers rated the gap between potential and actual math learning in an accelerated curriculum as being smaller ($M = 3.36$, $SD = 1.088$) than teachers did ($M = 3.63$, $SD = 1.010$), where $p < .05$.

Table 25

Descriptives for Survey Statement #12: t-test for Equality of Means

	Teacher		Non-teacher		*t*	*p*
	M	*SD*	*M*	*SD*		
Accelerated	3.63	1.010	3.36	1.088	2.29	.011

Survey question #18 asked, "What should schools do differently than usual, if anything, to challenge gifted math students fully?" Table 26 shows the major themes from $n = 229$ educators; the most common one ($n = 86$) pertained to the nature of the learning, such as targeting students with appropriately challenging problem-solving, rigor, and pacing, and another ($n = 55$) involved activities, such as greater opportunities for competitions, research, and projects. A third theme ($n = 40$) recommended more support in terms of general awareness of the needs of gifted students, including through better teacher training, and the final theme ($n =$

28) addressed the need to collaborate in class and out of class with skilled others, like their intellectual peers and adults.

Table 26

How Schools Can Challenge Gifted Math Students More

Recommendations	*n*
Targeting students' learning needs	86
More relevant activities	55
More support/awareness of students' needs	40
Collaboration with adults and intellectual peers	28

Recommendations for targeting gifted math students' learning needs focused largely on individualizing their learning opportunities in much the same way we individualize learning for other students who receive special education services. One respondent wrote that schools could "develop individualized learning plans for gifted math students, outlining specific goals, objectives, and strategies tailored to their unique needs." Another agreed, recommending a "[p]ersonalized study plan for gifted math students with higher difficulty math courses based on their abilities and interests."

Many educators pointed to applied outlets connected to students' interests and abilities. One suggested participation "in challenging math contests and activities, such as the Math Olympiad, mathematical modeling competition, etc." Another endorsed "math competitions, math clubs, or math camps where students can engage with higher-level mathematical concepts and problem-solving."

Still others emphasized the importance of more support and awareness for these students' needs. For example, one urged, "Just as we rush to get resources and supports for lower level learners, we need to challenge and accelerate our higher level learners." A second related concern was to "[t]rain gen ed teachers to understand the needs of gifted students and best practices in meeting those needs."

The final most frequent recommendation was regarding opportunities for challenging collaboration. For instance, one participant suggested "[g]roup tutoring with a math teacher or math professional." Another respondent proposed, "Give talented math students the opportunity to interact with each other, collaborate on problem solving."

Further relevant discussion and recommendations are to be found in Chapter 5.

Chapter 5

Discussion

The emphasis of this study was to consider the perceptions of educators—math teachers, administrators, and others—to generate understanding about the lack of the use of acceleration as a pedagogical strategy in mathematics. As referenced earlier, a consistent body of research on acceleration over the course of an entire century has supported this method, seemingly serving as a clear answer to the concerns often expressed by policymakers and educators about the inconsistent, frequently lagging achievement of American students in math.

Essentially all American primary and secondary schools are grouped and segregated by age, an arrangement that David Tyack called "efficient classification" (1974, p. 44). This long-standing structure, however, has elevated the role of students' birthdates above their academic and social learning. Students whose development in math is most in conflict with their age-based arrangement in schools—namely, those either furthest behind or furthest ahead of typical age expectations—are most at risk. Far greater educational resources are directed to students who are behind those benchmarks, leaving many students who merely surpass minimum competency standards to experience intermittent learning at best.

Yet this failure to meet such students' needs often meets ambivalence, at best, in the face of the factory model of education that characterizes our entire system of schooling. The modest educational responses—to the extent they exist—to the needs of advanced students historically have been through enrichment. This serves two masters: enrichment is less disruptive to the factory model than acceleration by better maintaining convenient age-grade peer communities of questionable benefit, and enrichment also causes much less consternation among adults concerned with social/emotional aspects of acceleration, issues unsupported by repeated research findings (Benbow & Stanley, 1996; Bernstein et al., 2021; Cross et al., 2015; Gross, 1993; Neihart, 2007; Rogers, 2015; Steenbergen-Hu & Moon, 2011).

Despite these and other researchers' robust endorsements of all methods of acceleration throughout many decades of academic and affective findings, applications in schools have been anemic. This study then fills a need, asking for the underreported views of educators in the trenches about the barriers, concerns, and possibilities in terms of acceleration, in order to increase students' development.

Research Questions

Therefore, the following questions served as organizing categories for the information solicited from educators:

1. What are educators' beliefs about barriers to curricular acceleration for students who would benefit from it?
2. What are educators' beliefs about whether gifted math students' needs should include opportunities for curricular acceleration?
3. What are educators' beliefs about the most appropriate grouping arrangements for advanced math students?
4. What are educators' beliefs about the most appropriate curricular pace for advanced math students?
5. What are educators' beliefs about gaps between the current performance and the potential of gifted math students?

Responses to the Qualtrics survey were received from teachers, principals, assistant principals, counselors, instructional coaches, and other educators, representing 48 of the 50 states in America (n = 818).

Discussion of Results

RQ1. What are educators' beliefs about barriers to curricular acceleration for students who would benefit from it?

A combination of logistical and philosophical issues was evident in responses to this question. The 713 teachers answered similarly—but not identically—to the non-teachers (i.e., principals, assistant principals, counselors, and other educators) when asked, "Which factors make it less likely that accelerated math coursework will be offered to classes or to individual students?" The four factors cited most commonly by teachers were the logistical constraint of scheduling and three related to belief systems: philosophical opposition to acceleration in the first place (namely "There is something unfair about some students doing different math than their peers … "), a focus on struggling learners, and no need for acceleration.

The 102 non-teaching educators outside the classroom, interestingly, did not find the potential scheduling issue to be nearly as challenging as the teachers did, citing it sixth (n = 26) out of 12 factors. Instead, one major concern pertained to the difficulty of using acceleration when a wide range of ability exists in a class. Like the teacher group, one of the top two factors for the non-teaching educators also was philosophical opposition. Other notable factors for this group were finding staff who could teach the courses, a focus on struggling learners (similar to the teachers' responses), and a preference "to use enrichment and move through the curriculum at the usual rate."

This preference for "the usual rate" certainly could be seen as directly conflicting with teachers' interest in acceleration; but when asked an open-ended question about teacher-led acceleration putting them out of step with colleagues, the non-teaching educators answered positively almost unanimously, while teachers' expectations of the response from their administrators and peers more frequently could be characterized as negative or neutral ($n = 69$) than positive ($n = 54$). It remains unclear whether non-teaching educators' responses reflected some degree of a social desirability bias, or whether non-teaching educators with more negative or neutral beliefs simply withheld their responses more often.

Modest agreement on the potential barriers to acceleration was identified in three negatively worded survey statements: expectations of social/emotional "drawbacks" ($M = 2.91$, a bit short of fully agreeing); negative self-esteem effects for low-performing ability groups ($M = 2.94$); and acceleration "isn't fair" to those students without accelerated coursework (very modest support, where $M = 2.61$). The first two of the three represent commonly articulated concerns, neither of which is supported by research outcomes (Bernstein et al., 2021; Cross et al., 2015; Kulik & Kulik, 1984; Richardson & Benbow, 1990; Robinson, 2004; Wai, 2015). The feeling of general unfairness was expressed by some in open-ended format, where terms included "equity," "gap," "equally," and "excluded," or even that the entire endeavor could "reify … violence." An example of the much more numerous opposing views was that "acceleration is an equity issue" in support of its role in facilitating appropriate development.

Overall, open-ended responses endorsing more math acceleration grounded their support in embracing the academic and social/emotional learning needs of these students, while the negative responses were grounded mostly in the perceived emotions and relative standing of other non-accelerated students.

RQ2. What are educators' beliefs about whether gifted math students' needs should include opportunities for curricular acceleration?

Educators—both teaching and non-teaching—showed the highest agreement ($M = 3.14$) with the initial survey statement: "Within each grade, our students demonstrate different levels of readiness for advanced math material." They largely endorsed providing accelerated math opportunities to gifted math students; over 75% of educators also supported these opportunities for students with above-average performance. Educators' support dropped precipitously when asked about providing acceleration for students of average achievement or below.

As referenced in Chapter 4, several significant effects for type of educator—teacher vs. non-teacher—were found on independent samples *t*-tests across most research questions. For the statement "Gifted math students are doing fine overall and therefore don't need special modifications to their curriculum," the teacher mean ($M = 2.70$) fell short of the "somewhat agree" rating, but non-teachers ($M = 2.17$) still rated this significantly lower, almost at "somewhat disagree." It is possible that teachers' ratings accounted for their awareness of students' current grades, assuming typical grades reflected at least reasonable performance on age-grade standards, judging student success on somewhat more specific grounds. Perhaps non-teachers, who would not know students' grades without making effort to access them, responded to the question more broadly.

Overall, educators in the survey endorsed the general need for acceleration in mathematics and broadening the scope of those opportunities beyond the highest-achieving students to bring in additional students. There was a diversity of responses about when to implement that acceleration. Middle school grades were cited as the most popular time (though still not cited by a majority of respondents), followed by grades 9-10. Barely a quarter of respondents supported acceleration in grades 3-5 and in grades 11-12, with less than half of that support for the K-2 grades.

This particular finding did not seem to align with the earlier ones in the category that apparently provided much more support for acceleration, especially since this was a "check all that apply" question that allowed for multiple responses. Some educators could have answered about when they thought that more acceleration opportunities should be provided in addition to what already exists. For example, since traditional interventions and programs for gifted students occur most commonly in grades 3-5, some may have felt the need for acceleration was not as strong given that context. Similarly, some may believe Advanced Placement coursework most typically available in grades 11-12 serves gifted/accelerated needs, lessening the urgency for additional interventions in those grade levels.

Regardless, educators indicated awareness of and support for the need for math acceleration in general, with a broad definition that also includes students of above-average achievement levels.

RQ3. What are educators' beliefs about the most appropriate grouping arrangements for advanced math students?

Educators overall agreed through both Likert-scale questions and open-ended questions that advanced math students should be grouped together. For the open-ended question "Should gifted math students have math class together, or should they be spread out in different math classes with everyone else?" those saying together (n = 190) greatly outnumbered those saying to spread them out (n = 84). The wording on the survey questions was limited to mathematics, but the wording of "together" responses citing gifted students' learning needs, social/emotional needs, and need for collaboration with intellectual peers (not necessarily age peers) could indicate those beliefs about how gifted students learn best may extend beyond the subject of mathematics. Educators also supported these three main themes (i.e., learning needs, social/emotional needs, and need for collaboration) from the open-ended questions in the Likert-scale statements.

Some educators endorsed the idea of balancing a desirable grouping of students by academic readiness with the usual grouping of students by age. This may help inform the potentially anomalous response in this category that supported the ability to meet all students' needs through curricular differentiation in a same-age, mixed-ability classroom. An independent samples *t*-test found significantly different levels of support for this, however, between teachers ($M = 3.10$) and non-teachers ($M = 2.77$). Some educators from both subgroups found the typical same-age grouping to be the desired arrangement for everyone at least part of the time.

Additionally, the vast majority of survey takers ($n = 719$) had no more than 10 years of experience, reflecting a young sample and one that had more overall experience with gifted students than usual. Current teacher training in many teacher-education programs is likely to endorse curricular differentiation in same-age settings, sometimes even in gifted education, so some younger teachers may have a greater degree of confidence with this approach than non-teachers.

Other educators insisted on same-age grouping for students regardless of their mathematics ability or performance, sometimes citing equity and fairness. In open-ended questions, these educators frequently endorsed a role for gifted math students to serve as a learning model and tutor for other students. Some of these educators tried to articulate the benefits of that role for the gifted math student, both academically and socially, and other educators focused only on the purported benefits that might accrue to other students without addressing the impact on advanced students.

What is sometimes implied and occasionally stated outright in these views is that gifted students consistently should serve as the expert in a learning dynamic with other students. It remains unclear in these arrangements when these other students ever get to be the expert teacher in math, or when gifted students have the chance to learn something new.

The common homogeneous-by-age grouping arrangement creates questionable dynamics where the majority of students are taught that they should, can, and want to learn from gifted age peers. A definition of "peers" defaults entirely to people sharing similar birthdays for educators who oppose letting advanced math students collaborate together in class, tacitly endorsing the supposed beneficence of the factory model of education. In contrast, similar to responses to survey question #19 that addressed the first research question, educators who mention students' learning and affective needs are more likely to support opportunities for advanced math students to collaborate on complex problems.

RQ4. What are educators' beliefs about the most appropriate curricular pace for advanced math students?

Of the five groups of math students identified (i.e., gifted, above-average, average, below-average, and lowest-performing), educators were most likely to agree that the "typical regular math class is taught at the right pace for" students of average achievement ($M = 2.76$), followed by above-average math students ($M = 2.65$), though even that score indicated only very modest support. Next came below-average and gifted students (both $M = 2.63$).

Another independent samples *t*-test found significant differences between the ratings of non-teachers ($M = 3.01$) and teachers ($M = 2.75$) as to whether math class proceeds at the "right pace" for students with average achievement. Additional research might ascertain whether non-teachers expect courses to be paced to such students and whether that would constitute endorsement. Further probing of teachers who disagreed could find whether a majority feel this pace is too slow or too fast.

Regardless, it is unsurprising that a range of educators from across the country would support the notion that American classrooms are most likely to be paced to “the middle,” an understood consequence of curricular pacing guides enforced for a generation by an educational testing regime that maximizes how many students can surpass minimum competency thresholds. Most students appear to be disserved by this pacing’s mismatching for their needs, certainly including gifted students who deserve to learn new material as much as any other subgroup of students.

Responses across a few open-ended questions regularly mentioned pacing in the context of a need for schools to provide a more appropriate and faster-paced educational match to the needs of advanced students. Some educators more interested in the potential impact of accelerated curriculum on students more likely to struggle expressed concern that those students might not be able to “keep up” with such pacing. That would be the ideal pace, however, for some students who need additional challenge, other educators noted in their responses. The theme of pace also was relevant to the following research question.

RQ5. What are educators’ beliefs about gaps between the current performance and the potential of gifted math students?

Many educators thought there was substantial room for improvement to maximize student potential. Major themes emerging from educators about fully challenging gifted math students included learning-focused answers about, for example, advanced problem-solving and increased pace to match their learning ability. They also endorsed more arenas for student competition and opportunities to demonstrate real-world work. Educators further articulated a desire for more awareness of the academic and social/emotional needs of gifted students, including the need to improve other educators’ knowledge in these areas. Collaboration with intellectual peers, including adults, additionally was mentioned as an important way to help close these gaps.

The 761 educators who addressed "the gap between potential … and actual math learning" were even more likely to characterize that gap for gifted math students in an accelerated curriculum as being "large" (n = 244) or "very large" (n = 168) when compared to a grade-level curriculum. Perhaps the accelerated curriculum represents an opportunity for these educators to remove the ceiling from the classroom and let students advance at a much healthier pace, if they view "potential" learning in a grade-level curriculum as inherently limited in comparison for gifted math students.

On independent samples t-tests, teachers were significantly more likely than non-teachers to describe the gap between potential and actual math learning as being wider in both grade-level and accelerated curricula. It may be the case that the differing daily vantage points of teachers and non-teachers create dueling perspectives that need to be reconciled through more frequent and more trenchant communication. Otherwise, some very noteworthy differences of opinion between educators in the possibilities of schooling may remain.

Limitations

The nature of online surveying is a far from exact science. It can be very difficult to ascertain whether each response is truly unique. It is possible that a person would try to submit multiple responses to increase the likelihood of being awarded a gift card, even modifying those responses enough to avoid detection. Teachers could take the survey together at work in groups, submitting individual answers but generally talking through and correlating their responses first.

A large majority of survey respondents indicated work experience of 10 or fewer years. That seems unsurprising since only online methods of communication were used to solicit participation, which would seem to produce a sample that skews younger, almost inevitably. That constitutes a limit on generalizability.

Generalizability also is influenced by other factors such as personal philosophy and overall background. The scope of this study's findings is best limited to the stated perceptions of the actual survey respondents and not the larger populations of such groups.

Despite the participation of a reasonably sized sample in this study, this is non-experimental research. It does not incorporate random assignment and does not manipulate any independent variables (Johnson & Christensen, 2000).

Potential bias is an ongoing concern when analyzing open-ended questions and even closed-ended responses. The researcher's professional background can be seen either as a positive influence overall or as a potential source of bias affecting the interpretation of responses.

Recommendations for Future Research

Several recommendations for additional research extend naturally from this study. These pertain to addressing additional domains of study, incorporating more experienced educators, incorporating more principals and central office decision-makers, incorporating parents and students, and addressing diverse community needs broadly.

Address Additional Domains

Reis et al. (1993) found that about half of the regular curriculum for high-ability students could be eliminated in language arts, science, and social studies, in addition to math. Reading in particular is an area where students often are grouped for academic readiness, due to their diverse reading needs even at young ages. Many issues raised in this study of educators' beliefs about students' diverse needs in mathematics also would seem to be pertinent to the teaching of reading. The current structure of K-12 schools appears to be most rigid in regard to required student topics with standardized tests, so exploration of the corresponding influence on reading/language arts, science, and social studies would be warranted.

Incorporate More Experienced Educators

As mentioned earlier, the large majority of educators who responded to this survey reported 10 or fewer years of experience. Broadening the population with those who are more experienced and likely older would be desirable for additional research studies. It would be valuable to report the effects that those experiences might have on educators' beliefs about a range of issues relevant to this study. Perhaps new issues would emerge, or current issues might change in importance one way or the other. Demographic attributes such as geographic settings or grade levels taught could generate significant interactions not yet seen with the current group of educators.

Incorporate More Principals and Central Office Decision-Makers

Also as mentioned earlier, the large majority of educators took this survey "primarily as a teacher" as opposed to "primarily as another educator." Further research is necessary with more of each type of educator outside the classroom serving vitally important roles in the success of students. In particular, it is worth exploring how beliefs affect the actions of more visible decision-makers like principals and less visible decision-makers like those in central offices. Many such educators across the country have made decisions in direct conflict with educational interventions demonstrated to facilitate high-level performance in students; adhering to research recommendations in conflict with personal philosophy, however, has not been a strong suit in our country's complicated relationship with expertise. Engagement with decision-makers who have final say is critical to understanding their pragmatic and philosophical concerns, as well as establishing more accountability for the outcomes they create for students and their families.

Incorporate Parents and Students

The primary stakeholders in schools are students and their families, but it seems that their perspectives are not solicited, let alone considered. Perhaps research-oriented endeavors would generate this missing information from parents and students, while also creating healthy expectations to promote communication between families and school decision-makers without the usual problematic power dynamics.

Studies asking parents and students to respond to educators' beliefs about students' schooling could be very compelling. For example, consider how families might react to educators who are philosophically opposed to implementing research that could best serve their children, as if these children were part of a power structure to be dismantled. To the extent that educators withhold or eliminate beneficial interventions for students, those families able to exercise what Giroux (1983) calls "cultural capital" reasonably will have to do so, finding paths outside the school system to address these otherwise unmet needs.

This ironically leaves such educators responsible for reinscribing the very inequality and social ills they often decry, exacerbating "excellence gaps" (Plucker & Peters, 2016) at the highest achievement levels often based on race, class, and gender. It would be especially worthwhile to hear more from a diverse group of able students whose families lack sufficient socioeconomic assets and who need strong public schools in order to develop optimally. This also could help explain whether positive academic interventions like acceleration feed society's anti-intellectual bias.

Address Diverse Community Needs Broadly

Jean Anyon once described the folly of ignoring context in educational matters thusly: "Attempting to fix inner city schools without fixing the city in which they are embedded is like trying to clean the air on one side of a screen door" (1997, p. 168). Her perceptive comment reasonably extends to this study's urban, suburban, and rural environments, which produce the widest imaginable range of circumstances and needs. The role of public education in society offers its educators at all levels a rare opportunity to be part of broader partnerships that can help to address the unique situations of students and their families. National, state, and local resources should be marshaled toward that end, accounting for varied cultural considerations to respond appropriately to a full array of diverse settings (Boothe & Stanley, 2004). Soliciting the views of members of individual communities can help researchers to comprehend their local needs and direct ideally targeted supports that best enhance each community.

Conclusion

The only positive aspect of COVID-19 was the historic opportunity to improve schooling, particularly its most outdated and ineffective characteristics. Yet it seems that even in desperation we did not apply our creative energies to reimagining how we educate most American students beyond synchronous and remote learning on a temporary basis. The inertia of the received factory model of education remains powerful and inhibits our consideration of preferable alternatives. Overall the findings of this study are consistent with prior research advising that student learning would be vastly improved if schools aligned learning with students' readiness and vast diversity, rather than their individual born-on dates (Benbow, 1998; Bernstein et al., 2021; Cuban, 2003; Kulik, 2004; Lubinski, 2004; Rogers, 2015).

Even with an entire century's worth of consistently positive research findings, most American students and their families are not permitted to benefit from various forms of academic acceleration, in mathematics or any other subject. Math holds a very powerful place in schooling, and yet we often do not provide students the opportunities to learn math through the methods that have been shown repeatedly to work best. Rather, students receive their learning opportunities based solely on age-grade goals and expectations run through an ancient factory model of education predating everyone currently alive on this planet.

Given the challenges this country has faced in this decade alone, it is not surprising that our attention is scattered and that our priorities are in flux. We are fortunate, however, to live in a country with enormous resources, and we simply have to be creative enough to educate everyone without the process being interpreted as a zero-sum game. Students who need greater academic challenge have the same needs and rights as their age peers to develop fully, and they have been poorly served by our educational system, especially in mathematics.

Incorporating the missing voices of educators who work in school buildings and classrooms with the nation's children will go a long way toward doing right by all students, including advanced ones who are out of step with the usual age-based obsessions of our public school apparatus. Hearing from the students and their parents directly might be more enlightening still. We can ask each other questions to make better sense of both our current barriers and opportunities to implement acceleration where appropriate, including how that can and should work. It is a necessary condition in order to address the diverse academic and affective needs of all students.

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Appendix A: IRB Approval Letter

MARSHALL UNIVERSITY®
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Office of Research Integrity
Institutional Review Board
One John Marshall Drive
Huntington, WV 25755

FWA 00002704

IRB1 #00002205
IRB2 #00003206

June 1, 2023

Bobbi Nicholson, Ph.D.
Leadership Studies Department, COEPD

RE: IRBNet ID# 2056397-1
At: Marshall University Institutional Review Board #2 (Social/Behavioral)

Dear Dr. Nicholson:

Protocol Title:	[2056397-1] Educators' Beliefs About Using Academic Acceleration with Gifted Math Students and Others	
Site Location:	MU	
Submission Type:	New Project	APPROVED
Review Type:	Exempt Review	

In accordance with 45CFR46.104(d)(2), the above study was granted Exempted approval today by the Marshall University Institutional Review Board #2 (Social/Behavioral) Designee. No further submission (or closure) is required for an Exempt study **unless** there is an amendment to the study. All amendments must be submitted and approved by the IRB Chair/Designee.

This study is for student Jason Gorgia.

If you have any questions, please contact the Marshall University Institutional Review Board #2 (Social/Behavioral) Coordinator Lindsey Taylor at (304) 696-6322 or l.taylor@marshall.edu. Please include your study title and reference number in all correspondence with this office.

Sincerely,

Bruce F. Day, ThD, CIP
Director, Office of Research Integrity

Appendix B: Demographic and Survey Questions

(The demographic questions shown below are screenshots as seen by respondents.)

Are you taking this survey primarily as a teacher or as another educator (like an administrator or counselor)?

- ☐ Primarily as a teacher
- ☐ Primarily as another educator

Professional experience (if none, leave box blank):

	Column Options	Column Options	Column Options	Column Options
	Years experience as:	Primary location of role (county, state--2 letters)	Primary career role	Most recent role
Teacher			○	○
Assistant Principal			○	○
Principal			○	○
Counselor			○	○
Other (specify title below)			○	○

(For each row where respondents enter a nonzero number for years of experience, they are prompted to complete the following matrix—only the title changes at the top. E.g., for teachers:)

Years of experience teaching in each community setting (if none, leave box blank):

	Rural	Suburban	Urban
Grades K-5			
Grades 6-8			
Grades 9-12			

(After all relevant tables are completed, everyone is asked:)

Select the setting for your most recent school-based experience:

	Rural	Suburban	Urban
Grades K-5	○	○	○
Grades 6-8	○	○	○
Grades 9-12	○	○	○

(For those whose answer to the first question after consent was "Primarily as another educator":)

Grade levels of students with whom you work

(For those whose answer to the first question after consent was "Primarily as a teacher", they answer these three:)

Grade levels and courses primarily taught

Years of experience teaching math (elementary or secondary) including current academic year (if none, enter "0"):

Most recent academic year teaching math (e.g., current year is 2022-23):

(Everyone is asked:)

On average, how many times per year do you have professional development related to:

	Times per year
Math	☐
Students who are gifted	☐
Students struggling in math	☐
Students gifted in math	☐

This survey defines "gifted" math students as approximately the five students in a class with the greatest ability, insight, and possibly performance, give or take a student or two depending on class type or size.

This survey defines math "acceleration" as a practice allowing some students to follow a curriculum earlier than other same-age peers (e.g., a 7th grade algebra student, or a fourth grader taking fifth-grade math) or at faster-than-typical rates (e.g., a one-year class covering one-and-a-half years of curriculum).

(Four choices for #1-10: strongly disagree, somewhat disagree, somewhat agree, strongly agree)

1. Within each grade, our students demonstrate different levels of readiness for advanced math material.
2. Teachers can fully meet the needs of all students in a mixed-ability classroom — including gifted math students — by differentiating the curriculum.

3. Gifted math students are doing fine overall and therefore don't need special modifications to curriculum.

4. Gifted math students benefit academically from learning together in the same math class with each other.

5. Gifted math students benefit socially/emotionally from being taught together in the same math class with each other.

6. Regardless of any academic benefits, I would expect to find drawbacks in terms of social/emotional well-being in the research on acceleration with students.

7. To provide effective math acceleration, schools should prioritize grouping math students by their readiness for advanced math content as opposed to their ages or grade levels.

8. Even if arranging students by ability were beneficial to some groups, it would create negative self-esteem effects for the lowest-performing groups.

9. Using acceleration with some students disrupts classroom communities, since it isn't fair to students who do not have accelerated coursework. (Please elaborate under your choice.)

10. (Please answer for each group.) The typical regular math class is taught at the right pace for:

Gifted math students

Above-average math students

Average math students

Below-average math students

Lowest-performing math students

11. Which math students would benefit from accelerated exposure to math? Select all that apply.

Gifted math students

Above-average math students

Average math students

Below-average math students

Lowest-performing math students

12. Which of the following terms best describes the gap between potential math learning and actual math learning for:

Gifted math students in a grade-level curriculum (None, small, medium, large, very large)

Gifted math students in an accelerated curriculum (Same choices)

13. In which grade ranges can math acceleration be appropriate for some students? Select all that apply: K-2; 3-5; 6-8; 9-10; 11-12

14. (For teachers) Which factors make it less likely that accelerated math coursework will be offered to classes or to individual students? Check all that apply (three or more):

A. Conflicts with the master schedule make using acceleration challenging.
B. The needs of the students I know are met already in their non-accelerated math classes.
C. We focus resources on struggling learners instead.
D. There is something unfair about some students doing different math than their peers, so I have some philosophical opposition to using acceleration.
E. Hiring staff/using current staff to teach accelerated math is difficult.
F. Any wide range of student ability in a class makes using acceleration harder.
G. Finding classroom space to utilize acceleration is challenging.
H. I’d prefer to use enrichment and move through the curriculum at the usual rate.
I. I lack administrative support for this.
J. I have not been trained to use math acceleration with students.
K. I wouldn’t be fully confident in teaching a more challenging accelerated curriculum.

L. I need more prep time outside of class to do more of this.
M. Other reason(s)—please list:

14. (For non-teachers) Which factors make it less likely that accelerated math coursework will be offered to classes or to individual students? Check all that apply (three or more):

A. Conflicts with the master schedule make using acceleration challenging.
B. The needs of the students I know are met already in their non-accelerated math classes.
C. We focus resources on struggling learners instead.
D. There is something unfair about some students doing different math than their peers, so I have some philosophical opposition to using acceleration.
E. Hiring staff/using current staff to teach accelerated math is difficult.
F. Any wide range of student ability in a class makes using acceleration harder.
G. Finding classroom space to utilize acceleration is challenging.
H. I'd prefer teachers to use enrichment and move through the curriculum at the usual rate.
I. There is not administrative support for this.
J. Our teachers have not been trained to use math acceleration with students.
K. Our teachers wouldn't be fully confident in teaching a more challenging accelerated curriculum.
L. Our teachers need more prep time outside of class to do more of this.
M. Other reason(s)—please list:

15. (For teachers) Rank order your choices for why accelerated math coursework is less likely to be offered. (The top factor is "1"; drag and drop them.)

A. Conflicts with the master schedule make using acceleration challenging.
B. The needs of the students I know are met already in their non-accelerated math classes.

C. We focus resources on struggling learners instead.

D. There is something unfair about some students doing different math than their peers, so I have some philosophical opposition to using acceleration.

E. Hiring staff/using current staff to teach accelerated math is difficult.

F. Any wide range of student ability in a class makes using acceleration harder.

G. Finding classroom space to utilize acceleration is challenging.

H. I'd prefer to use enrichment and move through the curriculum at the usual rate.

I. I lack administrative support for this.

J. I have not been trained to use math acceleration with students.

K. I wouldn't be fully confident in teaching a more challenging accelerated curriculum.

L. I need more prep time outside of class to do more of this.

M. Other reason(s)—please list:

15. (For non-teachers) Rank order your choices for why accelerated math coursework is less likely to be offered. (The top factor is "1"; drag and drop them.)

A. Conflicts with the master schedule make using acceleration challenging.

B. The needs of the students I know are met already in their non-accelerated math classes.

C. We focus resources on struggling learners instead.

D. There is something unfair about some students doing different math than their peers, so I have some philosophical opposition to using acceleration.

E. Hiring staff/using current staff to teach accelerated math is difficult.

F. Any wide range of student ability in a class makes using acceleration harder.

G. Finding classroom space to utilize acceleration is challenging.

H. I'd prefer to use enrichment and move through the curriculum at the usual rate.

I. There is not administrative support for this.

J. Our teachers have not been trained to use math acceleration with students.

K. Our teachers wouldn't be fully confident in teaching a more challenging accelerated curriculum.

L. Our teachers need more prep time outside of class to do more of this.

M. Other reason(s)—please list:

16. These final few questions are open-ended. Should gifted math students have math class together, or should they be spread out in different math classes with everyone else? Please elaborate why.

17. (For teachers) If a teacher-led effort to incorporate an accelerated curriculum for gifted math students in your school put those teachers out of step with what other teachers of the same grade or subject were doing, how would your administrators and peers respond?

17. (For administrators) How would you respond to a teacher-led effort to use an accelerated curriculum for gifted math students in your school, if doing so put those teachers out of step with what other teachers of the same grade or subject were doing?

18. What should schools do differently than usual, if anything, to challenge gifted math students fully?

19. Would you support an increased use of math acceleration in schools? Why or why not?

20. Please provide any final relevant comments and experiences about working with gifted math students in schools, including meeting students' diverse academic needs, any challenges in maximizing their potential, any changes over time that you've seen in schools, and the most appropriate classroom pace and grouping arrangements.