

FACTORS THAT CONTRIBUTE TO LOW ACHIEVEMENT ON THE SCIENCE
PORTION OF THE OHIO HIGH SCHOOL GRADUATION TEST

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Chapter 1

Introduction

Background Information

The enactment of the No Child Left Behind Act of 2001 prompted the states to implement a more rigorous method of determining students' proficiency in the five core content areas, reading, writing, mathematics, social studies, and science. Ohio drafted the Ohio Academic Content Standards and began to test levels of student proficiency concerning these standards in the 2004-2005 school year with the Ohio Graduation Test (OGT). As more data were collected annually from results of the Ohio Graduation Test, it becomes obvious that many students struggle in Ohio to reach the benchmark level for science proficiency. Results published for the 2007 Ohio Graduation Test show that only 72.1% of tenth grade students tested were proficient in science. 2006 results showed that only 73.1% of tenth grade students tested were proficient in science. 2005 results showed 73.0% of tenth grade students proficient (Ohio Department of Education, 2007). The current Ohio standard for the minimum number of proficient students is 75.0% for all five content areas (reading, writing, mathematics, social studies, and science). This has been met in all the content areas except science. This trend of low achievement in science on the Ohio Graduation Test warrants an examination of information that may afford insight into the cause of low science achievement and provide suggestions as to how performance can be improved in the science content area.

Statement of Problem

Seventy-five percent of Ohio's high school students pass four content areas of the Ohio Graduation Test. What is it about teaching science that produces insufficient achievement?

Research Questions

1. What factors appear to be the most significant affecting student's performance in science on the Ohio Graduation Test?
2. Are the proper accommodations and placements being made for students with learning disabilities for maximum success on the Ohio Graduation Test?
3. Could the Ohio Graduation Test be structured and administered for different academic pathways allowing for multiple diploma options for vocational students, college bound students, and students with learning disabilities?

Significance of the Study

The significance of this study is that it will provide insight into why students attain lower proficiency levels in science compared to the other content areas when taking the Ohio Graduation Test. Recognizing deficiencies in our educational process will allow recommendations to be made as to how to attain a level of higher performance in science.

Delimitations

This study will focus on Ohio science achievement and factors that contribute to low achievement on the Ohio Graduation Test. Literature from 1990 to the present will be included in the review.

Limitations

Literature reviewed for this study is limited to that available through Ohio University's Alden Library and all associated library loan programs and peer-reviewed journal articles retrieved from the World Wide Web.

Definition of Terms

This paper will use the following terms as defined:

Elementary School -school consisting of grades kindergarten through fifth grade.

Middle School -school consisting of grades six, seven, and eight.

High School -school consisting of grades nine through twelve. Also referred to as secondary school.

G-8 countries -an international forum for the governments of Canada, France, Germany, Italy, Japan, Russia, the United Kingdom and the United States.

Self-contained classroom -a classroom in which the teacher has the same students for the entire instructional day.

Ohio Graduation Test (OGT) -Required examination for graduation in the state of Ohio unless specified by the students individual education plan (IEP). This test measures minimum competency in five content areas.

Curriculum Based External Exit Exam Systems (CBEEESs) -an alternate testing method to minimum competency exams that places higher stakes on the individual student.

Individual Education Plan (IEP) -a written, legal contract developed to provide a student with learning disabilities the proper special education interventions. A team of educators and administrators writes this contract.

Inclusive classroom -regular class that includes students with learning disabilities.

Pullout classroom -class in which special education teachers offer specially designed instruction based on the needs of the student.

Proficiency -the minimum passing score for the Ohio Graduation Test. This score indicates that a student has the minimal skills necessary to apply content knowledge to real-world situations.

Limited-English Proficient -a student who has low mastery of the English language.

Longitudinal study -a performance study that follows a group a students over time.

Repeating cross-sectional study -a study that compares the performance of similar groups of students as time progresses (Example: comparing eighth graders in 1995 to eighth graders in 2005).

Methodology

A search of available literature was conducted using the InfoTree and ALICE, systems provided by Ohio University's library services, and various Internet search

engines. The search included articles from 1990 to present and was based on the key words “science achievement,” “factors contributing to science achievement,” “Ohio Graduation Test Results,” “content standards,” “ standardized testing,” and “Science education.”

Organization of the Study

Chapter One includes an introduction to this paper, statement of the problem of interest, research questions, significance of the study, delimitations, limitations, definition of terms, and the methodology of the research.

Chapter Two presents a review of the literature relevant to factors that contribute to low science achievement on the Ohio Graduation Test, placement options for students with learning disabilities to optimize overall performance, and structures of standardized testing that lead to different graduation options that are more appropriate based on the abilities of the student.

Chapter Three consists of an analysis and discussion of the literature concerning the factors that contribute to low achievement in Science on the Ohio Graduation Test as well as discussion of how students with learning disabilities are administered the Ohio Graduation Test and a review of different graduation options that are available to Ohio students.

Chapter Four presents a summary of the paper, conclusions based on the research, and recommendations for further research.

Chapter Two

Review of the Literature

The previous chapter described the structure of this paper. In Chapter Two the literature will reveal factors that contribute to low science achievement on the Ohio Graduation Test. The literature will also provide insight into the appropriateness of placement options and accommodations offered to students with learning disabilities to prepare them for the Ohio Graduation Test. Finally, the review of the literature will investigate different standardized testing options that lead to alternative graduation pathways. The research questions will organize the review of the literature in this chapter.

What factors most significantly affect student performance in science on the Ohio

Graduation Test?

Common sense leads one to believe that the performance level of students on any type of exam would have a direct relationship to how well the students are prepared for the exam. Pursuing this line of thought, the literature reveals some interesting points that shows there exists a serious lack of time and effort spent in preparing students for taking tests like the Ohio Graduation Test in elementary and middle schools. The 2000 National Survey of Science and Mathematics Education, NSSME, (Weis et. al., 2001) was a survey taken of 5,765 science and mathematics teachers in schools across the United States to assess how well prepared science and mathematic teachers are, and to determine what barriers exist to “effective and equitable science and mathematic education.” In this report, elementary teachers in self-contained classrooms were asked to indicate how many minutes per day were allotted to teaching science, mathematics, reading/language

arts, and social studies. The NSSME report indicates that in grades K-3 twenty-three (23) minutes per day were devoted to teaching science compared to one hundred fifteen (115) minutes per day for reading/language arts, fifty-two (52) minutes per day for mathematics, and twenty-one (21) minutes per day for social studies. Grades 4-6 teachers reported similar numbers. They allotted thirty-one (31) minutes per day for teaching science, ninety-six (96) minutes per day for reading/language arts, sixty (60) minutes per day for mathematics, and thirty-three (33) minutes per day for social studies. In short, this survey indicates that only 10.9% of instructional time may be devoted to teaching science in grades K-3 and 14.1% in grades 4-6 is devoted to teaching science.

Another interesting statistic revealed by the NSSME report is the lack of higher science education attained by teachers in elementary schools and early middle school. According to the survey, most elementary teachers grades K-4 earned their undergraduate degree in elementary education with only 4% of the surveyed teachers earning an undergraduate degree in science or science education. 56% of teachers in grades K-4 reported completing six (6) or fewer semester hours of science education in the process of earning their bachelor degree. Although the numbers are slightly higher for grades 5-8, there appears to be a serious deficiency in training for science educators in pre-secondary positions.

The NSSME report also surveyed teachers in grades K-6 in self-contained classrooms as to their own perception of their preparedness for teaching. The statistics reveal that only 18% to 29% consider themselves “very adequately prepared” to teach life, earth, or physical science content. In comparison, 52% to 76% of this same group of teachers view themselves “very adequately prepared” to teach reading/language arts,

mathematics, or social studies. The report, Science and Engineering Indicators 2008, S&E 2008, (National Science Board, 2008) examined the concept of “in-field/out-of-field teaching” with regards to teacher preparedness. This report indicates that although most teachers hold the appropriate certifications to teach but in middle schools a significant amount of science teachers are teaching “out-of-field” considering what their formal education prepared them for. The report indicates that 3% of teachers for physical science to 10% of biology teachers are teaching out of their area of science specialization. A report supporting this information (Ruby, 2006) examined the achievements in science of one group of high poverty, high minority, urban students receiving a readily available but specialized science curriculum as they advanced from the end of the 4th grade through the 7th grade.

The teaching treatment, the Talent Development (TD) model, applied to the group consisted of commercially available National Science Foundation material, professional development, and regular in-class support by expert peer coaches. The students achieved significantly better results than three matched control classes and twenty-three district middle schools with similar student demographics. Ruby identifies two obstacles to improving science achievement.

First, there is a lack of consistency within grades and between grades in what science material is being taught often resulting in re-teaching the same material rather than expanding on it. This lack of consistency can be attributed to school districts failing to establish a comprehensive science curriculum resulting in teachers preparing their own. The inconsistencies in presenting science content led to the second obstacle; without a prescribed curriculum and accompanying resources teachers tend to fall back

on material they feel comfortable teaching regardless of quality. Ruby identifies that many teachers do not feel qualified to teach middle school science citing inadequate background in science and insufficient professional development as the cause of these feelings. Another factor contributing to these feelings of inadequacy is the high turnover rate for teachers in high poverty, high minority, urban schools. As a result, many classroom teachers are in their first two years of teaching.

Continuing to review the literature, another factor that can affect science achievement is the apparent lack of student concern for high achievement in science. Several demographic factors influence student attitudes toward high achievement in science. The Science and Engineering Indicators 2008 Report (National Science Board, 2008) states that students enter kindergarten with varying degrees of science and mathematics skills. This report indicates that skill levels can be correlated to student race/ethnicity, socioeconomic status, and level of parental education, especially the mother of the student. S&E 2008 suggests that students enter school with a wide gap in science and mathematic abilities based on these factors and, to date, the gap gets little if any better as the student progresses through school.

This concept was also supported in an article entitled “Achievements in Mathematics and Science in an International Context” (Papanastasiou, 2002) where the findings of the Third International Mathematics and Science Study (TIMSS) were used to examine the factors that influence student achievement. In the United States’ contribution to the report it was noted that culture plays a significant role in student performance. This cultural based disparity in performance is glaringly evident upon review of Ohio’s 2007 results from the science portion of the Ohio Graduation Test (Ohio Department of

Education, 2008). Of the 10th grade Ohio students in public schools to complete the test, 80% of Asian/Pacific Islands students and 78% of White students were proficient or above on the test. In comparison, 49% of Hispanic students and 35% of African American students scored proficient. All other ethnicities fell within the range of these ethnic groups and represented a very small percentage of total students tested.

In a report entitled “Relationship of Family Support and Ethnic Minority Students’ Achievement in Science and Mathematics” (Smith, Hausafus, 1998), the authors suggest that minorities tend not to view themselves as “future scientists.” This article indicates that as minority students advance in school they become much less likely to choose a career in science, especially female minority students. This report also brings to light the affects of parental involvement on minority student performance in science and mathematics. This study identified two significant attitudinal beliefs that mothers of minorities hold as “My child needs only to know a minimal amount of science so advanced science courses are a waste of time,” and “Most of the jobs in today’s society do not require an understanding of mathematics.” This report concluded that parental expectations were important to achievement levels on standardized tests and that encouragement to take higher level science and mathematic courses should begin at an early age.

Low achievement by minority students and students of low socioeconomic status was further examined in a report that focuses on achievement gaps in social studies and science (Chapin, 2006). Using data from the Early Childhood Longitudinal Study, Kindergarten Class of 1998-1999 (ECLS-K), this report concludes that minority students and disadvantaged students have a serious deficiency in general science and social studies

knowledge prior to entering kindergarten. Based on the findings of the ECLS-K the achievement gap between these students and white students does not narrow by the end of grade one. This report further emphasizes the lack of importance placed on science achievement in minority and financially disadvantaged students. Lee and Burkman (2002), also analyzing the ECLS-K, confirm that disadvantaged students start with lower cognitive abilities and this problem is amplified in that many are placed in low-resource schools, have less well-prepared or experienced teachers, or live in poor areas. All of these factors contribute to negative attitudes toward high achievement in science.

The importance of positive parental support and involvement in science learning is discussed by Van Voorhis (2003). In this study, a body of sixth and eighth grade students was broken into two groups with one group completing interactive homework (parent involved) and the other group completing non-interactive homework (no parental involvement) for the eighteen-week study. The interactive group returned more homework assignments and students were more accurate. The interactive group also earned higher report card grades. Granted, this is a limited study. However, it does provide interesting support for the correlation between a student achievement levels in science and the amount of parental involvement that exists.

In review of the first research question, the literature has revealed that the major factors that appear to be affecting student performance in science on the Ohio Graduation Test are: 1) lack of instructional time spent on science education through elementary school and middle school; 2) lack of teacher preparedness, either in educational background, experience, or by improper assignment; 3) attitudinal beliefs relating to

culture and socioeconomic status that hinder high achievement in science, and 4) lack of parental involvement in science education.

Are the proper accommodations and placements being made for students with learning disabilities for maximum success on the Ohio Graduation Test?

In Ohio, all students are expected to take the OGT or some alternative assessment, including those with learning disabilities and English-limited students. According to information posted on the Ohio Department of Education's website only students with the most significant learning disabilities may pursue Ohio's standards based alternative assessment for students with disabilities (AASWD). The No Child Left Behind Act (NCLB) of 2001 limits the number of AASWD students to one percent of the total students tested. A student cannot be assigned to the AASWD based on "perceived probability" of poor achievement. The Individual Education Plan (IEP) team members determine participation in AASWD based on a "collection of evidence" indicating barriers to academic success. This entire process holds the number of exemptions to taking the OGT to a minimum.

As for students with learning disabilities who are required to take the test, again we must consider how well we are preparing these students to take the test. The Individuals with Disabilities Education Act (IDEA) requires states to place students with learning disabilities in "the least restrictive environment" to fully include the student. IDEA favors education in the general curriculum (Turnbull et al., 2004). IDEA requires schools to educate a student with a disability in the same classroom as students without disabilities to the maximum extent appropriate for the disabled student. IDEA prohibits

students with a learning disability from being removed from this environment unless it is determined the student cannot be successfully educated even after the school provides appropriate support services (20 U.S.C. 1412 [a][5], 2008). The literature reveals one study that compares the outcomes of students with learning disabilities when they are placed in inclusive versus pullout programs at two separate schools (Rea, et al., 2002). This study gives credence to the requirements of IDEA in that students in inclusive program scored higher in all content areas. The students in the inclusive program also attended school more regularly than pullout students. The authors suggest the inclusive school in the study achieved greater success due to the collaborative teaching structures in practice at the school. The more inclusive school gave teachers common planning time with special education specialists, had regularly scheduled team meetings that included general and special education teachers to discuss educational strategies and student progress, and practiced team teaching of classes with general and special education teachers. This study also emphasized the importance of initial teacher preparation and continuing professional development programs. The study pointed out the need to develop effective instructional and interpersonal skills to most appropriately organize and present content material to students with learning disabilities.

In another paper, Zigmond and Baker (1996) give a historical account of how the present full inclusion model of educating students with learning disabilities evolved. This paper describes how the pullout classroom was originally intended to provide the student with the necessary skills to be more successful in an inclusive classroom and once these skills were developed the student no longer would require the pullout service. However as time went on, a movement grew that advocated every student's right to access general

education classes, even students with severe learning disabilities. The movement, known as the Regular Education Initiative (REI), had several different variations but all involved bringing educational accommodations into the general classroom versus having them administered in a pullout setting.

In this scenario, the student with learning disabilities should be: 1) taught the skills necessary to function at the appropriate grade level of the inclusion class, or 2) the teacher should attempt to bypass the areas of weakness the student may have (Lewis & Doorlag, 1991). The intent of this initiative was to put a more shared responsibility on general and special education teachers for students with learning disabilities. After laying this groundwork, Zigmond and Baker discuss a previous study (Zigmond and Baker, 1995-a) they conducted that involved classroom observations in five different schools. Two schools had full inclusion classrooms with some pullout accommodations available. Three schools had full inclusion only. In all the schools, the observers found a good deal of adaptations and accommodations that made the content manageable by bypassing student weaknesses but unfortunately they found little remedial instruction that would improve the skills in managing content material when presented at the appropriate grade level of the handicapped student.

Zigmond and Baker also examine results of teacher interviews and classroom observations at three other full inclusion schools in Pennsylvania, Kansas, and Washington State in this report. The investigation revealed several deficiencies in how accommodations are designed and applied to students with learning disabilities. First, accommodations for students with learning disabilities were generally used for the entire class. Second, very few accommodations were designed for a particular student. Third,

students with learning disabilities were expected to do less than students without disabilities. Fourth, peer-partners (“study buddies”) were used to help students with learning disabilities without any training for the more advanced partner. Fifth, very little individual instruction was used for students with learning disabilities.

From this article, it can be concluded that our approach to full inclusion is flawed by lack of teacher preparation, relaxed expectations for students with learning disabilities, lack of one-on-one student/teacher interaction, and limited professional development. We can also conclude that some degree of pullout style education will always be appropriate for some students, especially ones with more severe learning disabilities.

When it comes actually to taking a high-stakes, standards based test, accommodations are afforded the student with learning disabilities during the test taking process to supposedly showcase their mastery of the content material uninfluenced by the student’s disability. The 2008 Ohio District Test Coordinators Manual for the OGT states accommodations provided must be consistent with what is “regularly provided in the classroom,” deemed necessary by the student’s IEP team, and can not give a student an unfair advantage over students without learning disabilities. Some specific accommodations spelled out in the coordinators manual for student with learning disabilities or students with limited English proficiency in the Coordinators Manual are: 1) use large print and Braille versions of the test for students with visual impairments, 2) use the test read aloud and/or an English audio CD for students who need audio administration of the test for various reasons, and 3) provide for students with limited English Proficiency foreign language audio CDs (or oral translation script to be read by translators if the appropriate CD is not available).

Federal law does allow for more specific accommodations (20 U.S.C. 1412 [16] [A]) as long as they are identified in the students individual education plan. Fuchs et al. (2005) question the validity of accommodations such as these and others deemed necessary by IEP teams stating that heterogeneity in the population of students with learning disabilities makes it difficult to identify valid assessment accommodations for standards based tests. These authors contend that teachers take the primary role in determining a student's assessment accommodations since they have the greatest amount of educational engagement with the student. They go on to state that previous research indicates that teachers have not been very effective at choosing assessment accommodations that benefit students citing that student demographics may influence a teachers decision in awarding accommodations on "gut feelings" rather than a student's educational needs. Fuchs et al. identify the need for truly "individualizing" assessment accommodations using a brief assessment process during the development of a student's IEP. This process would identify valid assessment accommodations that would give students with learning disabilities the greatest gains in scores without compromising the fairness of test administration.

In review of the second research question, the literature has revealed several areas of concern when considering proper accommodations and placements for students with learning disabilities for maximum success on the OGT. First, federal law allows little leeway for alternate assessment of students with learning disabilities. Second, educators may have taken full inclusion to the extreme resulting in less individual interactions with learning disabled students as well as a degrading of the curriculum for students without learning disabilities. Third, teacher preparation and professional development play a role

in the effectiveness of both classroom and assessment accommodations. Fourth, the development of assessment accommodations for a student with learning disabilities tend to be based more on sympathy and “gut” feelings rather than a statistically based diagnostic evaluation of the true needs of the student.

Could the Ohio Graduation Test be structured and administered for different academic pathways allowing for multiple diploma options for vocational students, college bound students, and students with learning disabilities?

Under the No Child Left Behind Act (NCLB), states are allowed to develop and administer their own graduation tests. The content standards being taught and the level at which a student is deemed proficient is also determined by the state in which the exam is given. NCLB requires that all schools be 100% proficient by 2014. A recent Time magazine article (Wallis and Steptoe, 2007) questions whether or not the states can be trusted to set standards and assess a student’s mastery of these standards. This article infers that possibly states have set their standards too low to show better progress in reaching the goal of 100%. These authors refer to this phenomenon as “the race to the bottom.” In support of this declaration, the authors used data from the National Center for Education Statistics to compare proficiency levels on state administered fourth grade reading test to proficiency levels attained on a much more rigorous reading exam prepared by the National Assessment of Educational Progress (NAEP). The comparison showed that for almost every state, the percentage of proficient students was much greater on the state administered test than on the NAEP test leading one to assume that states are making their tests easy to show that students are performing better than they

actually are. Although its students have come close, Ohio has yet to reach its benchmark goal of 75% proficiency in science. In light of this article, one has to wonder whether Ohio's reported science proficiency levels greatly overestimate how well Ohio students master science content material.

The concept behind the No Child Left Behind Act is that all children will become proficient in the same concept standards by the year 2014. The literature reveals some doubt as to whether or not this goal is realistic. In a report that questions the validity of accountability and due process of the No Child Left Behind Act (NCLB), Orlich (2004) states that, globally, students in the United States perform at top levels when taking advanced placement exams in science. This proves that highly effective instruction is producing high achieving students in the United States. Orlich hints at the need for different academic directions when he notes that most G-8 nations other than the United States segregate students into academic versus vocational pathways by grade eight. Orlich's concern is that all schools are destined to fail under the NCLB because adequate yearly progress targets will show little or no improvements annually even if the school is approaching 100% proficient. Adequate yearly progress targets are used as a measure of how schools are progressing toward total proficiency. NCLB requires schools to show adequate yearly progress to avoid scrutiny and possibly punishment from the federal level.

Orlich also points out the staggering cost of and the inappropriateness of the use of a single high stakes test to make life-changing decisions for someone else. Aside from the demoralizing aspect of multiple failures on standardized tests for individuals, Orlich argues that NCLB ignores schools' constitutional fifth amendment rights subjecting

schools to double jeopardy when held accountable for the same violation on an annual basis if achievement goals are not met. In summary, this article points out serious deficiencies of NCLB, the foundation upon which the Ohio Graduation Test was constructed, leading one to believe that a better system should be developed to measure student achievement.

The literature reveals an alternative to minimum competency exams, like the Ohio Graduation Test, in Curriculum Based External Exit Exam Systems (CBEEESs) (Bishop, 1998). In his article, Bishop contends that individual students have no stake in doing well on tests like the OGT. He says the stakes are attached to teachers and school administrators rather than the individuals taking the test. Bishop does credit competency exams with reducing the number of students with very low basic skills but goes on to state that the passing standard is very low on these types of tests. With a low passing standard many students easily pass on the first attempt and there is no incentive for students to do any more than the bare minimum in their studies to complete their secondary education. Bishop goes on to state that lower achieving students feel that the effort required to pass a competency test is not worth the reward and will give up on trying to pass the exam. Bishop also feels that a numerical grade should be given on these types of exams rather than a pass/fail grade stating that a numerical grade may stimulate students to greater effort.

Bishop identifies several characteristics of CBEEESs that he contends makes these systems preferable to minimum competency exams. Some of these characteristics are already in place for the administration of the OGT. However, there are some notable differences. First, he feels CBEEESs raise the stakes for the individual student to do well

in that the results of these exams may be a major factor in qualifying for college or better jobs. There is no incentive for high performance on the OGT. The only goal is to merely pass the test. Second, CBEEESs provide multiple assessment pathways possibly stimulating greater effort from students. The OGT offers only one assessment option. And finally, CBEEESs are appropriate for almost all students. Bishop states that a single exam taken by all is not essential. He points out that many nations using CBEEESs have high- and intermediate-level exams and students are allowed to choose which subjects they wish to be tested in. Bishop used statistical data from the 1991 International Assessment of Educational Progress (IAEP) and the Third International Mathematics and Science Study (TIMSS) to support his preference for CBEEESs. He concluded that when comparing countries of comparable level of development, countries with CBEEESs academically outperform countries that do not.

Another article, published by the National Center on Educational Outcomes (Johnson & Thurlow, 2003), examines states' graduation policies for students with disabilities. Specifically, this article looks at the intended and unintended consequences of the states' various graduation policies. The authors present a survey that was developed to obtain information about states' graduation policies as well as how the respondents felt these policies affect students with disabilities. The survey obtained responses from 46 of 50 states. Of the respondents, 13 states (including Ohio) offer only a standard diploma (or a standard diploma and honors diploma) as a graduation option. The other respondent states offer up to seven diploma options for students.

27 of the respondents confirmed that they currently require or soon will require students to pass a high-stakes exit exam as a graduation requirement. This figure is

significant in that it points to the evolution of states toward curriculum based external exit exams discussed earlier in Bishop's article. Johnson & Thurlow point out that the use of these "high-stakes" tests have long term consequences and can directly affect a person's self sufficiency and well-being as an adult.

Johnson & Thurlow discuss the ongoing controversy in the field of education over the use of "high-stakes" testing as a graduation requirement. Critics of high-stakes testing feel that more stringent graduation requirements may result in these negative consequences: higher dropout rates for students with disabilities, minorities, and poor students. Increased retention of students within grades. Increased referral of general students to special educations. "Teaching to the test" (the narrowing of curriculum and instruction focusing on state standards). Limitation of student options because instructional time is spent in an effort to improve a student's ability in areas of weakness identified by testing while taking away from time the student could be receiving vocational training, training in adult-living skills, or participating in a work-study program. Critics also express concern over the unknown impact of receiving an alternate diploma in regards to postsecondary education and employment opportunities.

In support of high-stakes testing, Johnson & Thurlow state that proponents of the use of these exams feel that high-stakes exams motivate students and teachers to concentrate on learning goals that will better prepare them for life. They go on to point out that students with disabilities and minority students are often the victims of low expectations and weak instruction. They indicate that some researchers feel that these groups will greatly benefit from high-quality instruction in preparation for these tests.

Johnson & Thurlow expose a similar argument over the use of alternate diploma options. They state that proponents of using a single diploma option maintain a high level of expectation over a wide variety of students. On the other hand, advocates of multiple diploma options feel that it is fair or reasonable to develop different graduation options with alternate performance objectives for students who have difficulty passing state exit exams.

In both cases, the arguments over high-stakes testing and single versus multiple diploma options, it is recognized in this article that the research supporting each of these positions is limited and inconclusive to determine which method has the greatest impact on an individual student's future opportunities after secondary school.

To shed additional light on this matter, Johnson & Thurlow conducted the aforementioned survey to determine the intended and unintended consequences of using high-stakes exit exams as a graduation requirement. The survey also explored single versus multiple diploma options. Approximately 50% of the states responded to questions about whether or not to require students with disabilities to pass an exit exam and whether single or multiple diploma options should be used. The survey revealed that most respondents feel that requiring students with disabilities to pass an exit exam achieves its intended consequences in that more handicapped students will achieve positive results in general education classrooms, educators will use various instructional techniques with accommodations to ensure success of students with handicaps, and students with disabilities will have greater opportunities post secondary if academic expectations are increased.

Alternatively, the respondents felt that requiring students with disabilities to pass an exit exam will produce several unintended consequences. Repeated failures will result in lowered self-esteem and higher dropout rates. Some students may have to remain in school longer. School districts may be forced to alternative diplomas just to provide some sort of exit credential.

When questioned about using a single diploma option for graduation, the respondents felt that several intended consequences could result. They believe that expectations are maintained and more students with disabilities will receive a diploma. School personnel, post-secondary institutions, and employers, will view all students equally because they participate in the same coursework. Students will develop a sense of equity, leading them to stay in school. Students will have greater opportunities after high school. The respondents felt that several unintended consequences could result from the use of the single diploma option. As graduation requirements increase, fewer students receive diplomas and dropout rates will increase. The standard diploma may be viewed as representing a less challenging curriculum simplified to accommodate lower achieving students. States may be forced to lower standards. The number of special education students remaining in school until the maximum exit age may increase.

When questioned about the use of the multiple diploma option, the respondents indicated the following intended consequences could likely occur. High academic standards could be better maintained for a standard diploma. The number of students receiving some sort of diploma could increase. The dropout rate could likely decrease because students with handicaps would have more options. Students could be more easily recognized for outstanding performance. However, respondents felt that unintended

consequences could occur as well. Expectations could be lowered for students with handicaps. Diplomas other than standard or honors diplomas could be considered inferior. Multiple diploma options may isolate students with disabilities from the general curriculum. The use of multiple diploma options could present administration and communication problems. Students with other than a standard diploma could have limited opportunities for postsecondary education and employment.

Johnson & Thurlow state in this report that the information gathered in their survey represents only a “snapshot” of the states various diploma options and their graduation testing requirements. The survey does raise several questions that apply to all students that are required to take exit exams for graduation. Do exit exams limit educational experiences and learning opportunities of students? Could some other measure be used to determine a student’s eligibility for a standard diploma? Do state exit exams limit a school’s ability to use alternative diploma options that are not perceived as inferior? These authors feel that answering these questions could have significant impact on how states define “adequate yearly progress” as a measure of how schools are performing.

Summary

The literature has revealed many factors that contribute to low science achievement on the Ohio Graduation test. Investigating the research questions has identified significant factors that affect student performance, including improper or inadequate accommodations for students with learning disabilities, and an inflexibility in the administration of the Ohio Graduation Test. Chapter Three analyzes the information

gathered from the literature review and Chapter Four will offer conclusions, a summary of the paper, and recommendations for future practice and further research.

Chapter Three

Analysis of the Literature

Chapter two presented a review of the literature as to why there is low achievement on the science portion of the Ohio Graduation Test. Chapter Three provides an analysis of the literature reviewed in Chapter Two. As in Chapter Two, the research questions organize the analysis of the literature.

What factors appear to be the most significant affecting students performance in science on the Ohio Graduation Test?

The literature revealed several significant factors that affect student performance in science. The most noteworthy of these factors is the serious lack of time spent teaching science content in elementary grade classes. Analysis of the literature reveals that many elementary teachers have taken few science courses and view themselves as inadequately prepared to teach science content. This lack in training and self-confidence leads to teachers spending more time on subjects that they feel more confident with, primarily math and reading. A report issued by the National Research Council (Duschl et.al., 2007) emphasized the minimal accomplishments of standards-based reform in science education and stressed the need for state and local school systems to provide, “sustained science-specific professional development” to improve teacher’s ability to teach science. This report identifies the need for teachers to increase their science content knowledge and also their ability to recognize how students learn science. This report also calls for reforms to university science courses to better prepare prospective teachers in teaching K-8 science curriculum. It also calls for federal agencies that support professional

development to require funded programs to be based on methods that promote science proficiency. In summary, the National Research Council has identified the deficiencies in teachers' ability to teach science with confidence and recommend changes to our current system of preparing teachers to meet our student's needs

Next, the literature identified an apparent lack of concern for high achievement in science, apparently driven by several demographic factors that affect student attitudes as another factor contributing to poor performance on the Ohio Graduation Test. It was discovered that students enter school with varying degrees of science and mathematics skills. Lower skills can be attributed to such factors as cultural/ethnic attitudes, socioeconomic status, and level of parental education. The gap existing prior to entering school between lower achieving students and higher achieving students tends to carry, without narrowing significantly, throughout the entire educational process. Zaharias and Bain (2008) propose several concepts to improve the skill levels of disadvantaged students, prior to entering school, thus reducing the learning gap that exists between students of differing backgrounds.

First among these is to acknowledge that the entire responsibility for closing the achievement gap does not rest entirely on the educators but must be shouldered by the entire society. Affordable housing in stable neighborhoods, decent wages and health care, and early childhood education programs are cited as crucial in eliminating difference in skill levels between students entering school. Providing these basic social needs to all should improve stability in families and increase parental involvement in the educational process. Providing these social needs to all will come at a great, but necessary, cost if we are truly dedicated to high achievement for all students. The

literature has revealed that reducing achievement gaps in education, consequently improving overall performance, will require cultural reform in our country as well as educational reform.

Are the proper accommodations and placements being made for students with learning disabilities for maximum success on the Ohio Graduation Test?

It was recognized from the literature review that federal and state law provides limited options for alternative assessment of students with learning disabilities other than the Ohio Graduation Test. After five years of the No Child Left Behind Law in practice many educators and policy makers are starting to realize that the goal of 100% passage of state developed proficiency tests is unrealistic. In reality, some students, regardless of their placement or accommodations, may never pass the Ohio Graduation Test under the current system and educational time could better spent on educating students to be healthy, self-sufficient members of society.

The National Education Association (NEA, 2008) opposes the lack of “commonsense flexibility” by testing students with learning disabilities and student with limited English proficiency and is supporting legislation that modifies the assessment process for students with learning disabilities. The pending reauthorization of the No Child Left Behind law will likely involve changes to the law that swings the purpose of testing to a diagnostic tool and instructional guide rather than a measure of overall accomplishment. Using the results of standardized tests in this manner would satisfy the need, identified in the literature, for statistically based evaluation of the learning needs of the student.

The review of the literature also revealed that some restructuring of the full inclusion concept spelled out by the Individual with Disabilities Education Act (IDEA) might be in order. Full inclusion requires teaching students with learning disabilities the necessary skills to be successful at the appropriate grade level in a regular classroom. Teachers are also asked to bypass areas of weakness students may have in route to learning key concepts. These processes might be better taught in a pullout style environment for the benefit of both students with learning disabilities and regular education students. Instructional time can be lost while accommodations are being offered in a regular classroom. Also, the argument can be made that the curriculum in the regular classroom becomes “watered down” for the success of handicapped students and at the expense of regular education students. Again, the issue of teacher preparation and personal development were identified in the literature as crucial for teachers to acquire the skills necessary to present material effectively in the classroom without sacrificing instructional time and quality content for all.

In summary, the literature revealed that the proper accommodations and placements are not being made for students with learning disabilities for maximum success on the Ohio Graduation Test. It was revealed that the testing process lacks flexibility and that supplemental instruction for students with learning disabilities could improve the quality of education for both learning handicapped and regular education students.

Could the Ohio Graduation Test be structured and administered for different academic pathways allowing for multiple diploma options for vocational students, college bound students, and students with learning disabilities?

The review of the literature produced discussion of several different testing methods and diploma options that could be used in lieu of the current systems in place in Ohio. The information suggests that our schools will fail by not being able to achieve adequate yearly progress as higher proficiency percentages are reached or our students will suffer because the curriculum will be simplified to enable more students to pass the graduation test. Either way, the quality of the education afforded to our students will be compromised.

Opponents of minimum competency tests, like the OGT, agree that repeated failures on these tests could increase the dropout rate for students with learning disabilities. Also, simplifying the curriculum to increase the passage rate will result in reduced effort by regular students in all areas, as they do only enough to get by. Knowing this, it seems logical to revise the system to provide multiple educational pathways. One suggestion noted in the literature was to have multiple diploma options that have different assessment methods to determine success. Another option is to stay with the single standard diploma option with varying levels of assessment difficulty or different test content entirely based on post secondary plans of the student. Adoption of one of these alternative methods would be costly, requiring additional administrative intervention to determine students career potential early enough in the educational process to allow the student to pursue the proper academic pathway.

Summarizing, the literature revealed that the Ohio Graduation Test could be administered in a manner to provide options for students to pursue different academic pathways that are more practical for the students needs. The Individuals with Disabilities Education Act requires educators to tailor the educational process that best suits the student for success. A similar process could be applied to all students to maximize achievement.

Chapter Four

Introduction

This study investigated the factors that contribute to low science achievement on the Ohio Graduation Test. The study was organized around three research questions:

1. What factors appear to be the most significant affecting students performance in science on the Ohio Graduation Test?
2. Are the proper accommodations and placements being made for students with learning disabilities for maximum success on the Ohio Graduation Test?
3. Could the Ohio Graduation Test be structured and administered for different academic pathways allowing for multiple diploma options for vocational students, college bound students, and students with learning disabilities?

Summary

Current statistics from the Ohio Department of Education indicate that achievement on the science portion of the OGT has shown only minimal improvement since implementing the science portion in 2005. Indications are that we have hit a wall in our road to achieving our goal of 100% efficiency in science. In response to this data and the results of this investigation it appears that changes must be made to our current methods of teaching science and assessing our students if we are to accomplish our ultimate goal, which is to prepare students to be healthy, functional members of society. Allotting sufficient time for science teaching and providing teachers with the skills necessary to be confident in teaching science appear to be “first-step” essentials if we are to improve significantly in science education.

There also appears to be a need for cultural change if we are to advance to higher levels in science achievement. Attitudinal changes in the family are critical if students are to see the importance of learning science. Reducing poverty and increasing family stability could lead to improvements in parental involvement in their children's education, lessening the burden of responsibility placed on educators for high achievement in science.

Finally, we must consider that our goal of 100% proficiency in science may not be a realistic goal and design academic pathways and assessments that still produce individuals who lead meaningful, productive lives in society. This change will require not only attitudinal change but also legislative change to allow flexibility in the state and federal laws that define the process by which education is administered.

Conclusion

The conclusion drawn from the literature is that there is a need for reform in our current process of preparing our students for and administering the science portion of the Ohio Graduation Test. Legislators, administrators, and educators must work cooperatively to develop a science curriculum and assessment that is adequate and flexible to achieve success for all students. To accomplish this, an overall cultural change in attitude is needed in which all parties take ownership in our educational process concerning science. Monumental change like this can only be accomplished through commitment starting with our countries leaders and ending in the classroom.

Recommendations for Research

The following areas are recommended for further research to better establish the change necessary to produce success on the science portion of the Ohio Graduation Test:

1. Further research should be conducted into determining the proper amount of time necessary for science teaching time throughout elementary and middle school to produce positive results on the Ohio Graduation Test.
2. Investigations should be conducted to determine the training necessary to adequately equip teachers with the knowledge and skills to be competent science teachers.
3. Additional research needs to be conducted into methods of providing a stable, supportive home life for students with socioeconomic disadvantages.
4. Further investigation needs to be conducted into the possibility of alternative graduation pathways that do not hinder post-graduation opportunities for students.

Recommendations for Practice

The following recommendations would be applicable to the state of Ohio:

1. Provide adequate funding for professional development for all elementary and middle school teachers to be highly qualified science teachers proficient in both content and methodology.
2. Properly staff full-inclusion classrooms with regular teachers and intervention specialists to better facilitate accommodations for learning handicapped students without sacrificing course content quality for all students.

3. Beginning as early as possible, provide support counseling out of the school environment for students with socioeconomic disadvantages and their guardians to increase awareness to the importance of learning science.

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