Frederick Classical Charter School

Application Excerpts for Parents and Teachers

"At its best, general education is about the unity of knowledge, not about distributed knowledge. Not about spreading courses around, but about making connections between different ideas. Not about the freedom to combine random ingredients, but about joining an ancient lineage of the learned and wise. And it has a goal, too: producing an enlightened, self-reliant citizenry, pluralistic and diverse but united by democratic values."[1]

"Education, true education, should liberate; it should cultivate the genuinely free man, the man of moral judgment, of intellectual integrity; it should give us the power to see the other side; it should impart nobility of purpose and kindliness of spirit."[2]

[1] https://www.goacta.org/publications/downloads/WhatWillTheyLearnFinal.pdf
[2] http://www.edexcellence.net/detail/news.cfm?news_id=372

Executive Summary

1. Vision for the public charter school and a mission statement as to how the vision will be achieved

The mission of the Frederick Classical Charter School is to provide elementary and middle school-aged children in Frederick County with a well-rounded, college-focused instructional program that develops students' knowledge, reason, and self-expression. The long-term vision of the Frederick Classical Charter School is to be nationally recognized as a replicable model for providing a traditional, rigorous liberal arts education using well-researched instructional approaches. Through its Summer Institute and in-service training, the school will provide teachers with professional development in subject matter content, cognitive science, and research-based pedagogy. The principal, staff, and school improvement team will look first to data and evidence to better school performance, with the guiding criteria that each enhancement should be specific, replicable, and monitored to validate the achievement of its intended results.

2. Overview of the needs to be addressed by the public charter school

Currently, there are no public or private schools in Frederick County that offer the combination of academic features described in the next section. Our school fulfills the need of parents who believe their children's goals can best be met through a classical approach. The benefits of the school's approach to classical education include studying Spanish and Latin in elementary school, a reading program cited by a top reading researcher as one of two programs in line with scientifically-based reading research[3], a world-class math program cited as exemplary by the National Math Panel[4], and a chronological treatment of history that serves as the organizing structure for science and the humanities and exposes children to rich cultural content from around the world. In addition to appealing to parents already familiar with the benefits of a classical education, our school will mount an outreach program to attract students from a broad cross section of the community. Our goal is to equip all students with the knowledge and skills to be successful in high school and attend the college of their choice, regardless of socioeconomic background. The benefits to the school system include building a community of practice focused on classical content and scientifically-based teaching techniques while positioning FCPS as a leader in a growing movement toward offering a classical education in public school settings.

3. Brief description of the program to be implemented including any specific focus of the program

The classical approach to education follows the trivium, which divides the twelve years of education into three phases: grammar, logic, and rhetoric. The "grammar" phase is from kindergarten through fourth grade, and emphasizes not just grammar, as its name suggests, but the knowledge and skills that are the building blocks of all subjects. The "logic" phase is from fifth through eighth grade, and develops students' ability to reason, using the

[3] http://www.sopriswest.com/pdfs/whole_language_high_jinks.pdf, accessed on July 24, 2010
[4] http://www2.ed.gov/about/bdscomm/list/mathpanel/report/final-report.pdf, page 21, accessed on July 24, 2010

knowledge and skills from the previous phase as the starting point. The "rhetoric" (sometimes called "poetic" phase) is from ninth grade through twelfth grade, and develops students' ability to marshal their knowledge, skills, and logic to persuade others and engage in self-expression. Our proposed school addresses the first two phases of the trivium, as illustrated below.

	Phase	Emphasis
Our School	**Grammar (K-4)**	Fundamental knowledge and skills (or "grammar") of all subjects—not just English grammar.
Our School	**Logic (5-8)**	Building on existing knowledge and skills, use reasoning to learn more and to more deeply understand previous learning.
High School	**Rhetoric (9-12)**	Marshal knowledge and reason to persuade others and express student's own views.

It is important to note that the trivium describes the emphasis at each phase, not an exclusive focus. In the classical approach, instruction at all levels will involve elements of knowledge and skill acquisition, reasoning, and self-expression. In terms of subject matter, all areas are considered important to students' development and are mutually reinforcing. There is no emphasis on any particular subject area over any other subject. Students are expected to put their best efforts into mastering each subject.

In ***math***, our students will focus on learning a smaller number of topics in greater depth, which gives them more time to master the material. Our emphasis is on solving multi-step, challenging, non-routine problems as well as learning the standard algorithms and why they work. This approach is designed to prepare students for a traditional Algebra I course in eighth grade that focuses on the topics needed in high school math and beyond.

In ***reading and English***, our students will begin their study by using a reading program that emphasizes all five components of scientifically-based reading instruction, including systematic and explicit phonics instruction that has been shown to prevent serious reading difficulties in the vast majority of children. Students will receive instruction in proper grammar and punctuation and will be expected to marshal their logic and express their creativity through writing. Students will be exposed to a wide selection of literature at all grade levels.

In ***history***, our students will complete two chronological sweeps through history: an introduction in grades 1-4 (starting with ancient history in first grade and proceeding to modern times in fourth grade) followed by a more in-depth sweep in grades 5-8. Providing a strong focus on history in the elementary grades and covering the material in even greater

depth in middle school will provide solid preparation for high school study in which students are expected to draw conclusions using original source materials. The school will also utilize the resources of the Historical Society of Frederick and the Maryland Historical Society[5]. The science and humanities topics reflect the time period being studied in history, as illustrated below.

	Grades			
Topic	1 → 5	2 → 6	3 → 7	4 → 8
History & Humanities	Ancient	Middle Ages	Renaissance	Modern
Science	Biology	Astronomy & Earth Science	Chemistry	Physics

In ***science***, our students will focus on the "big ideas" of physics, chemistry, biology, and earth science to prepare them for further study in those fields. Students will learn through conducting experiments, teacher-led demonstrations, and studying textbooks and other written materials.

In ***art and music***, our students will become familiar with important artistic works and artists, often from the same time period they are studying in history. Students will develop their own artistic and musical abilities through a comprehensive, well-sequenced program.

In ***foreign language***, our students will learn Spanish, Latin, and some Greek. The primary focus is on Spanish instruction, which will begin in kindergarten with a focus on oral vocabulary. Spanish instruction progresses toward reading, writing, and formal grammar study in later years. Latin instruction is provided in grades 4-6, and is integrated with the study of English morphemes (prefixes, suffixes, roots) that are Latin derived. Fifth and sixth graders study more complex Latin-based forms, and sixth and seventh graders also study words used in literature, math, science, and philosophy that are based on Greek combining forms. Seventh and eighth graders may choose to study Spanish or Latin as their foreign language.

4. Proposed start date and duration of the charter

The start date is August 2013. The proposed charter length is four years, which would end the last day of school in July 2017. We plan to seek renewal every four years.

[5] http://www.hsfcinfo.org/education/school_groups.htm and http://www.mdhs.org , accessed July 24, 2010

B. Educational Programs and Services

1. Philosophy and goals of the program

The philosophy of the program is based on a combination of empirical research and common sense. We started with our primary goal to prepare all students to succeed in high school and attend the college of their choice, and our secondary goal to have students develop an appreciation for the classical liberal arts. The underlying purpose of pursuing these goals is not just college preparation or appreciation of the classics, but because pursuing them will equip students for citizenship and lifelong learning. We worked backwards from these goals to determine what knowledge and skills should be taught. Next, we examined research and case studies to determine what approaches were successful in imparting this body of knowledge and skills. Lastly, we examined both research and case studies of successful schools to develop a school culture and governance structure that encourages parents, students, and staff to be fully engaged in the pursuit of educational excellence.

2. Education levels to be offered (preschool, elementary, middle, secondary)

The school would serve students in grades K-8.

3. Student to teacher ratio

The school will have 20 students per class.

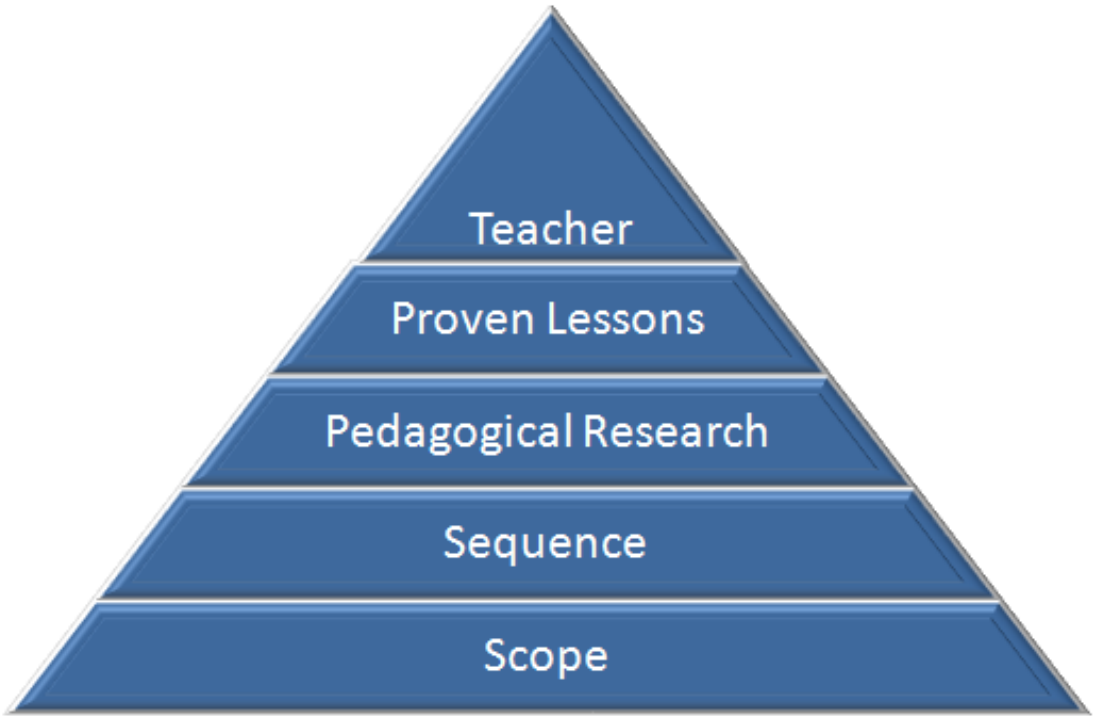
4. Unique focus of the school program as appropriate (i.e., reclaiming dropouts or utilizing specific instructional programs)

The school's unique focus is delivering a classical liberal arts education through instructional programs with track records of success for a wide variety of students. The specific instructional programs to be utilized are outlined below.

Subject	Main Instructional Program	Supplementary Materials
Math	• Grades K-6: *Singapore Math*, U.S. Edition • Grade 7: *Pre-Algebra*, by Glencoe • Grade 8: *Algebra,* by Glencoe	• Plastic Base Ten Class Set, by Learning Resources • Teacher-Developed and Selected Materials*
Reading English Handwriting	• Grade K-5: *Reading Street, 2011* from Scott Foresman/Prentice Hall • Grades 6-8: *Prentice Hall Literature, 2010* from Prentice Hall • Grades 6-8: *Houghton Mifflin Grammar & Writing* from Houghton Mifflin	• *50 Nifty Activities*, from Sopris West • *Primary Spelling By Pattern*, from Sopris West • *Phonics and Spelling Through Phoneme-Grapheme Mapping*, from Sopris West • *Vocabulary Through Morphemes*, from Sopris West • *Teaching Basic Writing Skills School Set,* from Sopris West • *Gilgamesh: Man's First Story, Black Ships Before Troy: The Story of the Illiad, The Wanderings of Odysseus, The Adventures of Robin Hood, The Midwife's Apprentice, Midsummer's Night Dream, The Call of the Wild, A Christmas Carol, To Kill a Mockingbird, The Gift of the Magi, Number the Stars, Night, Anne Frank: The Story of a Young Girl*: from various publishers (listed in budget section) • Teacher-Developed and Selected Materials*
History	• Grade K: *Core Knowledge Kit*, from Pearson • Grades 1-4: *The Story of the World: History for the Classical Child: Volumes 1-4* by Susan Wise Bauer • Grades 5-6: *Journey Across Time* by Glencoe • Grades 7-8: *America: History of Our Nation* by Prentice Hall • Grades 7-8: *World History 2011*, by Prentice Hall	• All Grades: *Grace Abounding: The Core Knowledge Anthology of African-American Literature, Music, and Art* • All Grades: Maps, Globes, Supplements by Houghton Mifflin • Grades 1-4: The Story of the World Activity Book, Volumes 1-4 by Susan Wise Bauer • Grades 1-4: The Story of the World Tests and Answer Key, Volumes 1-4 by Susan Wise Bauer • Grades K-5: *Timelinks Classroom Set*, by McGraw Hill • Teacher-Developed and Selected Materials*
Science	• Grade K: *What Your Kindergartener Should Know*, from Core Knowledge • Grade 1: *R.E.A.L. Science Odyssey (Life)* by Pandia Press • Grade 2: *R.E.A.L. Science Odyssey (Earth & Space)* by Pandia Press • Grade 3: *R.E.A.L. Science Odyssey (Chemistry)* by Pandia Press • Grade 4: *RealScience-4-Kids Physics I* by Gravitas Publications • Grades 5-8: *Science Explorer* by Prentice Hall	• Grade 1: *What's Biology All About?*, by Usborne • Grade 2: *The Story of Astronomy and Space*, by Usborne • Grade 3: *What's Chemistry All About?*, by Usborne • Grade 4: *What's Physics All About?*, by Usborne • Teacher-Developed and Selected Materials*
Art	• Grades K-8: *Classical Art Sequence*, by Doris Shamieh	• Teacher-Developed and Selected Materials*
Music	• Grades K-8: *Musicplay* by Themes and Variations	• Teacher-Developed and Selected Materials*
Spanish	• Grades K-5: *Vive El Espanol* by McGraw Hill • Grades 6-8: *Realidades* by Prentice Hall	• Teacher-Developed and Selected Materials*
Latin	• Grades 4-6: *Ecco Romani I-III* by Pearson • Grades 7-8: *Latin for the New Millenium 1-2* by Bolchazy-Carducci	• Teacher-Developed and Selected Materials*
Physical Education	• Teacher-Developed and Selected Materials*	• Teacher-Developed and Selected Materials*

5. Instructional methods to implement the curriculum

Students will be taught through a variety of instructional methods that are supported by research. Our approach starts with the scope of the knowledge and skills to be taught in each subject. These topics are treated as a knowledge system and are analyzed to determine the big ideas, connections between topics, and logical sequence in which the content will be presented to students. Generally speaking, the information within a body of knowledge takes four forms—verbal associations, concepts, rule relationships, and cognitive strategies. Lessons are developed that use an appropriate instructional strategy for each form of knowledge and strategically integrate students' prior knowledge. To the degree that they are available, teachers deliver proven, field-tested lessons, making adjustments as needed and employing creativity and common sense to engage students in their learning tasks. This approach is illustrated below.



Students are assessed to determine the lesson with which they should begin and are grouped accordingly in math and reading. In general, lessons are designed in small increments, with most reviewing previously learned material and introducing an easily digestible "chunk" of new material. Instruction generally proceeds at a brisk pace (as opposed to a lecture), with students responding to the teacher's questions frequently to maximize engagement. The specific teaching techniques used within a lesson will depend on the content to be taught and the instructional level of the students and will be selected based primarily on two criteria: effectiveness and efficiency. The rationale for the effectiveness criteria requires little explanation—what has worked in the past is likely to work in the future. The rationale for efficiency being a consideration is twofold. Time-consuming approaches will tend to decrease student attention and engagement, and for students who are behind, more efficient approaches can help them catch up to their peers.

The instructional approaches address all aspects of Bloom's Taxonomy: knowledge, comprehension, application, analysis, synthesis, and evaluation. The importance of acquiring background knowledge to facilitate higher-order thinking skills is recognized, as well as the role of higher-order thinking skills in promoting knowledge retention and comprehension. A detailed list of specific pedagogical principles and techniques appear in Appendix C.

6. *Extracurricular offerings*

The school will offer extracurricular programs based on student interests, the availability of adults to lead the programs on a volunteer basis, and whether enough other children are interested to make the program viable (such as a team sport). At the beginning of each school year, parents will be asked to indicate their child's interests and their availability to support an extracurricular program. Staff will also be given the opportunity to indicate their interests in supporting extracurricular programs. The school will attempt to provide each child who wishes to participate with at least one extracurricular activity that matches his or her interest.

7. Extended day program/supplemental programs – both free and fee-based

Before and after care will be available on a fee-basis through a vendor selected by the school's Board of Trustees. Parents will be asked to complete a survey indicating their satisfaction with the vendor at the end of each school year, and the Board of Trustees will weigh parents' recommendations heavily in their annual decision to select the vendor for the school year.

11. Provision for transportation, if appropriate

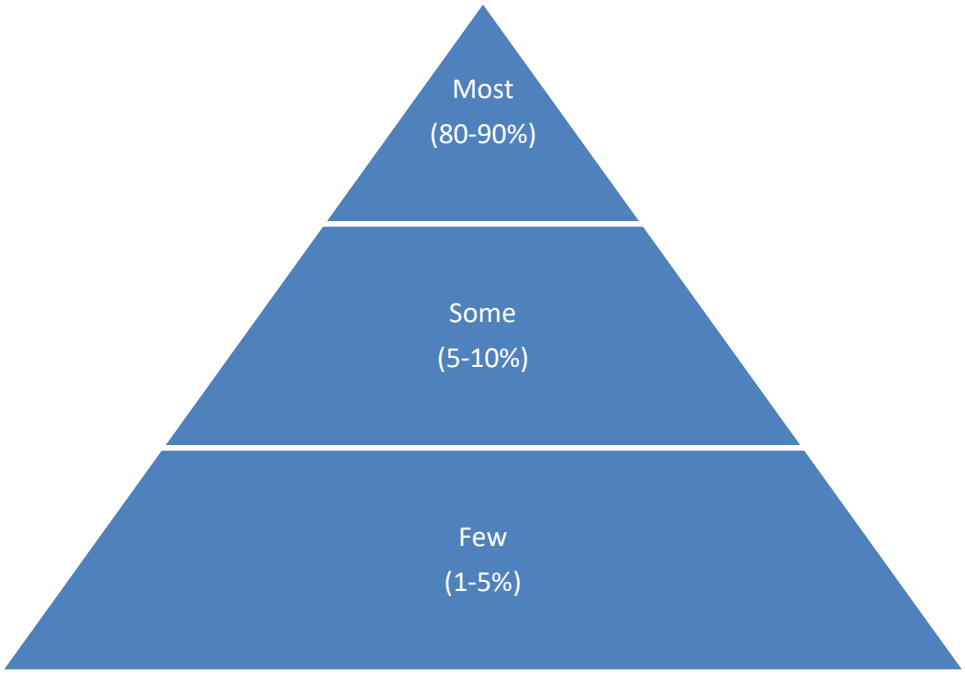
Parents will provide transportation to and from the school, per FCPS regulation 400-15. If this application is approved, during the charter signing period, the applicant is interested in discussing the possibility of obtaining a waiver from this regulation in the case of students whose parents/guardians do not have a vehicle and are unable to arrange for transportation.

C. Special Populations

1. *Provision for students with disabilities (IDEA and Section 504) to be included in the educational program*

The school will employ a Response to Intervention (RtI) model that employs three tiers of intervention. This approach begins by screening all students early in the school year, providing interventions as needed, and monitoring the progress of those measures through curriculum based measures and other assessments. Students who do not respond well to the interventions provided will receive additional interventions or different interventions. The intensity of the interventions increases as students move from Tier I toward Tier III. The goal of RtI is to prevent failure before it happens through a more proactive approach, instead of the "wait to fail" approach that relies on discrepancies between IQ and achievement tests. [6]

[6] Sentence credited to http://www.ldonline.org/article/13002, accessed on June 27, 2010



Students will receive special education services in accordance with the student's IEP (Individualized Education Plan). Special education services will be provided by FCPS out of the deduction from the per pupil allocation for these services that applies to charter schools. The current special education programs in use by FCPS for reading that the Frederick Classical Charter School also plans to use include Read Naturally, Horizons, and Corrective Reading. In addition, per FCPS the special educators who work at the school will be provided with some funds that may be used to purchase additional materials.[7] Subject to the availability of these funds and a properly trained educator, the applicant will provide Spalding as an additional Tier II reading intervention, and provide two additional Tier III reading interventions: an Orton-Gillingham-based approach, and Lindamood-Bell. Additional materials used or purchased for subjects other than reading will vary based on the students' IEPs.

2. Provision for English Language Learners to be included in the educational program

Provisions for ELL students will follow the same procedures as FCPS. Every ELL student will have a learning plan, and ELL instructors collaborate with mainstream teachers to deliver content-based and English-specific ELL instruction.[8] The Frederick Classical Charter School adheres to the following principles when it comes to the approach for ESL instruction[9]:

- Research shows that ELLs need comprehensive, high-quality English language instruction in order to "catch up" with their English-proficient peers. Immersion in English-medium classrooms is not sufficient to support the development of high academic levels of English language proficiency. Comprehensive, direct, and high-quality instruction about the English language, including speaking, listening comprehension, reading, and writing, is required to support an ELL's development of

[7] Per email sent on March 26, 2010 12:20 AM from FCPS Charter School Liaison
[8] http://www.fcpsteach.org/docs/Frederick%20County%20Public%20Schools%20ELL%20Overview1.doc, accesses June 28, 2010
[9] All bullet points were derived from http://www.doe.mass.edu/ell/cdguide/?section=premises, accessed on June 28, 2010

academic English. ESL instruction must be as carefully planned and delivered, as is any content area instruction.

- ELL students will receive explicit, direct instruction about the English language intended to promote English language acquisition by LEP students and to help them "catch up" to their student peers who are proficient in English.
- The use of topics and materials that ELLs encounter daily in their content classrooms can and should be productively used during ESL instruction. Reading research consistently shows that students need multiple exposures to vocabulary and multiple opportunities to use vocabulary before they can be said to have fully acquired it. Infusing the language and materials of content instruction into ESL instruction multiplies ELLs' exposures and opportunities to practice language of academic content. This approach, content-based ESL instruction, is productive as well as sensible.

Subject-specific support for ELL students will occur both through teacher-provided materials and adaptations, and vendor-produced adaptations and materials.

Subject	Description of Adaptations
Reading/Language Arts	ELL kit provided as a part of *Reading Street, Pearson Literatrure,* and *Prentice Hall Grammar.*
Math	*Singapore Math* is designed for students in Singapore who do not speak English as a native language. The program uses illustrations and cartoons to communicate key concepts, with relatively simple English directions.
Science	Teacher-designed supports will be provided for the *Pandia Press R.E.A.L. Science* series and the *RealScience-4-Kids Physics* resources. An ELL kit is provided as a part of *Prentice Hall Science Explorer.*
History	In addition to teacher-designed supports that will be provided for the *Story of the World* series, audio recordings of the books are available for purchase if needed.[10]
Art	Teacher-designed supports will be provided.
Music	Teacher-designed supports will be provided.
Spanish	In addition to teacher-designed supports, *Realidades* includes alternative assessments and books for Spanish-speaking students.
Latin	Teacher-designed supports will be provided.

The Frederick Classical Charter School will follow FCPS regulation 500-34. Parents will receive written notification that their child will receive ELL services, and students will be assessed via the LAS Links Proficiency Assessment.

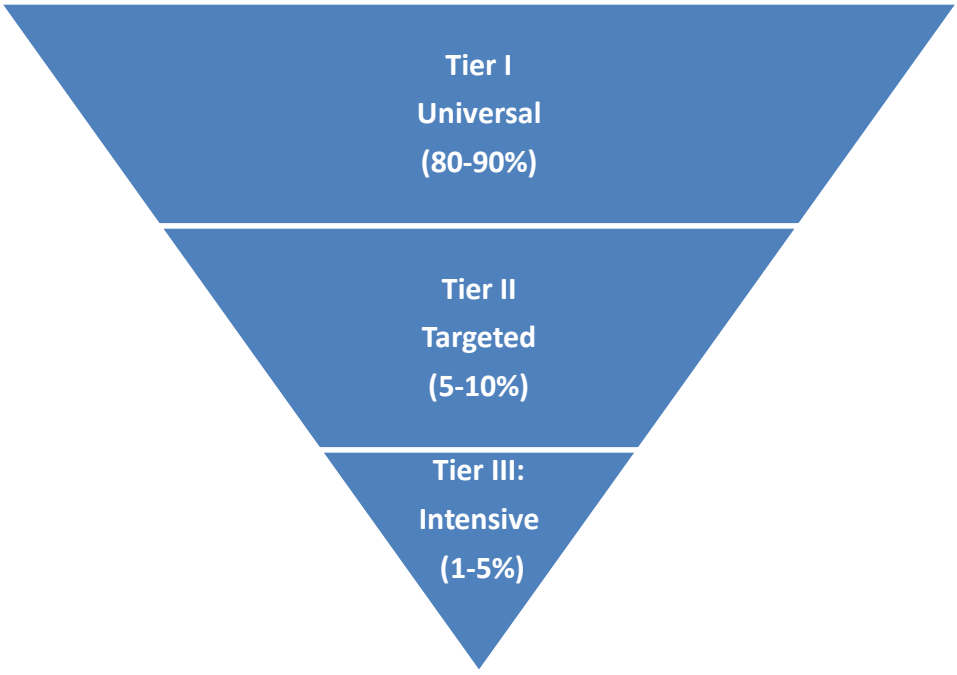
3. Provision for "gifted and talented" students to be included in the educational program ***(Section Added by Applicant)***

Like special education and ELL students, "gifted and talented" learners need academic interventions. Provisions for "gifted and talented" pupils are not regarded as a privilege or reward for high-achieving students,

[10] http://www.amazon.com/Story-World-History-Classical-Ancient/dp/0974239100, accessed on July 5, 2010

but rather as a necessary academic intervention to help students reach their potential. The school's provisions for "gifted and talented" learners parallels the Response to Intervention (RtI) approach used for special education. Tier I involves universal differentiation techniques that apply to all students, which are appropriate for approximately 80% of students or more. Tier II involves targeted interventions for students who demonstrate the ability to handle more challenging work or learn material more quickly. Tier II is estimated to be 5-10% of students and offers differentiated instruction through enrichment and acceleration, as described below. The approximately 1-5% of students in Tier III require instruction where the content presented and the teaching approaches used are differentiated to the point where it would not be possible for students in the other two tiers to succeed in Tier III.

In each tier, teachers may differentiate instruction through a variety of techniques that are described on FCPS' web site "Gifted and Talented Differentiated Instruction".[11] The tiers of differentiation are illustrated below.



For "skill subjects," the focus of differentiation is on acceleration. For "content subjects," the focus of differentiation is on enrichment. This focus is merely a focus, and not a limit on how instruction may be differentiated. Both acceleration and enrichment will be used as appropriate.

In reading, students are assessed to determine their current skill level and are flexibly grouped within the same class or attend a reading class in a higher grade level. In math, students are assessed to determine their current skill level and are placed into one of two classes grouped by skill level within their grade or attend a math class in a higher grade level. Students are assessed at the beginning of the year and mid-year using the Singapore Math placement test or an equivalent test, and may change groups as their performance dictates. Students also undergo formal assessment and re-grouping at the mid-year point. Differentiated instruction for math is to accelerate and enrich students who are ready to move to the next level.

[11] http://gtdifferentiation.sites.fcps.org/, accessed February 3, 2010

Differentiation in "skills subjects" of reading and math is through acceleration and enrichment. Students will not just learn material as a faster pace, but will also learn more advanced material. Differentiation in "content subjects", such as science and history, is focused primarily on enrichment. The classical approach to science and history focuses on a single topic (chemistry or ancient history, for example) each year, which facilitates differentiation techniques such as independent investigation, extension menus, and additional reading and projects, since students have the benefit of additional time to focus on an area of interest.

D. Student Outcomes

In addition to the standards used by the Board of Education of Frederick County and the Maryland State Board of Education (I, MSA) and how they will be addressed, describe any additional:

1. *Educational outcomes to be achieved*
    a. Students will master the knowledge and skills taught in our classical liberal arts curriculum, as evidenced by the measurements outlined immediately below (Section D.2).

2. *Measurement and reporting of student performance and progress*
    a. Students will take the Singapore math mid-year and end-of-year exams and the results will be published with student identifying information removed.
    b. Students will take the appropriate DIBELS assessments for their grade level; the results will be published with student identifying information removed.
    c. Students will take vendor- and/or teacher-produced exams in history and science, and the results will be published with student identifying information removed.

3. *Non-academic goals to be achieved*
    a. Student and Parent Satisfaction – This will be measured by the annual parent satisfaction survey, a draft of which is listed in Appendix C. Year-over-year trends will be published. The School Improvement Committee discussed in the next section will serve as the focal point for improving student and parent satisfaction.

    b. Parental Involvement – Parent involvement will be encouraged by the creation of a Parent Teacher Organization (PTO), which supports the following activities, as well as others that may be added later:

        i. ***School Improvement Committee*** – Made up of parents and teachers, this committee serves is the school's improvement team and fulfills the requirements of FCPS policy 440.3.G. The primary focus of this committee is improving the school's academic program and facilitating communication between parents and school staff to resolve concerns. Section G.12 of this application describes this committee in greater detail.
        ii. ***Parent Education Committee*** – This committee is responsible for offering parent nights featuring locally and nationally known speakers on the benefits of a classical education, scientifically-based reading instruction, issues in curriculum and instruction, how parents can help their children succeed, charter school law, and other topics related to the school's mission.
        iii. **Volunteer Committee** – This committee coordinates all volunteer efforts for the school, including but not limited to, classroom volunteering, after school programs, and field trips.

    c. Teacher Satisfaction – This will be measured by the annual survey listed in Appendix D, and year-over-year trends will be published. As discussed in Management Plan (Section G.11) of this

application, the annual 360 degree evaluation of school administrators will include measurements of teacher satisfaction, and teachers will sit on the School Improvement Committee.

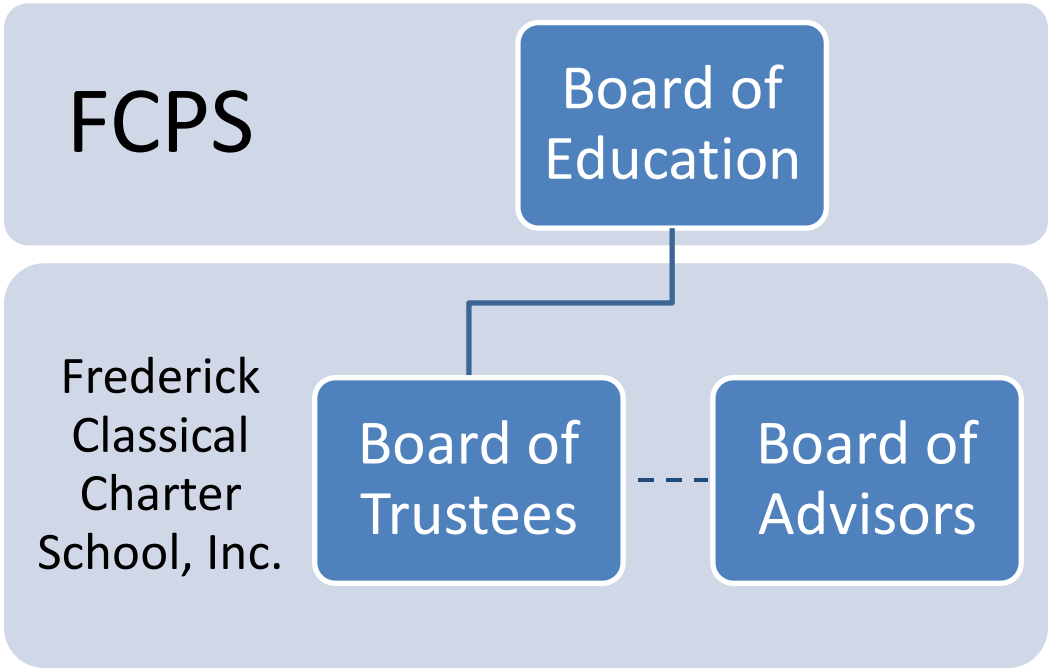
d. Summer Institute and In-Service Training – During the summer break, the school will offer a Summer Institute to provide teachers with professional development opportunities focused on the content and pedagogy used at the school. Subject to space limitations, this Institute will be open to all teachers in FCPS at no charge, and to teachers in other systems for a fee. Pending approval from Maryland State Department of Education, the courses offered will fulfill Maryland certification requirements for continuing education. To the degree possible, the Institute will feature top researchers and practitioners, with a long-term goal of creating a nationally recognized professional development program. A detailed description of the Summer Institute and In-Service Training appears in Appendix E.

e. Transparency – The school will endeavor to make its operations easily evaluated by parents, administrators, and the general public.

    i. ***Budget*** – The school's check register(s) and other financial account(s) will be published each month. (Note: The account numbers will be removed to prevent fraud). The annual budget will be presented down to the line item, and year-over-year trends in spending will be reported as a part of each year's budget proposal.
    ii. ***Facilities*** – The school will publish all inspections of its physical plant on its web site.
    iii. ***Staffing*** – The resumes of all staff will be published on the school's web site. Per the No Child Left Behind Act, upon request, parents will be informed of their child's teacher's "highly qualified" status.[12]
    iv. ***Instruction*** – Because the school will develop and employ a sequence of pre-written lessons, parents whose children are enrolled can view the lessons that students will be taught. Upon request, parents considering the school and other interested citizens will be provided with access to copyrighted materials produced by vendors on a temporary basis.
    v. ***Student Progress*** – Student progress on reading assessments will be available to parents on a monthly basis in grades K-2, and by request in higher grades. For math, can track progress through students' workbooks and through communication with their child's teacher. As described in Section D.2.d above, additional measures of achievement beyond Maryland's testing program will be published on the school's web site.
    vi. ***Meetings –*** All Board of Trustee meetings and committee meetings will be recorded and posted to the school's web site.

The governing structure is illustrated below.

[12] http://www.learningpt.org/pdfs/qkey6.pdf



The Board of Trustees of the Frederick Classical Charter School, Inc. will serve to manage the affairs of the non-profit organization and will develop policies and procedures to direct the school administrator who supervises the school staff and oversees the curriculum and implementation of the charter of the Frederick Classical Charter School. The Board of Advisors will consist of locally and nationally known education scholars and practitioners, business professionals, and others whose experience and expertise will be sought by the Board of Trustees to help the school fulfill its vision and mission. The Board of Advisors has no authority over the school, and functions only in an advisory capacity. The roles and responsibilities are defined in Appendix G, which lists the bylaws of the Frederick Classical Charter School, Inc.

The current members of the Board of Trustees are as follows:

Position	Name
President	Tom Neumark
Vice President	Ginger Mortarello
Secretary	Sue Middleton
Treasurer	Leslie Mansfield
Officer	Holly O'Shea

The current members of the Board of Advisors are as follows:

Name	Background
Bob Astrove	Robert Astrove holds a B.S. in Business Administration from Ithaca College, and an MBA with concentration in Finance from the University of Maryland. Mr. Astrove has worked as a financial and operations analyst as well as developing business management software for clients in the Federal and private sector. Today Mr. Astrove is the Systems Manager at the Bryant Group, a large mechanical contracting firm headquartered in Maryland. Mr. Astrove has been an active education advocate focusing on areas of school finance and special education. He has testified many times before bodies such as the state legislature, local government. Mr. Astrove has served on the Board of Directors of the Ivymount School in Rockville, is a former chair of the Montgomery County Special Education Advisory Committee, and is a former candidate for the Montgomery County Board of Education.
Lyda Astrove	Lyda Larkins Astrove holds a B.A. in French from Vanderbilt University, where she also completed coursework to obtain a Tennessee Secondary School teaching certificate. After working for two years on Capitol Hill as a staff assistant to the Honorable William H. Natcher (D-KY), she attended Stetson University College of Law, obtaining a Juris Doctor degree in 1984. Ms. Astrove's practice has focused on special education law, assisting families of children with disabilities to obtain appropriate special education services. She is on the Board of Directors of the Montgomery County chapter of the Autism Society of America, the former PTA President of the Ivymount School, and a member of the Montgomery County Task Force on Persons with Severe Disabilities. She is the mother of two children with disabilities.
Nick Diaz	Born and raised in Havana, Cuba, Mr. Nick Diaz is a middle school mathematics teacher at The Barnesville School and resides near Middletown. He graduated from the University of Dayton in 1969, and four years later moved to Frederick with his wife, Marianne. He retired in 2003 after 30 years with Frederick County Public Schools. As a mathematics teacher at Gov. Thomas Johnson Middle School in Frederick, Mr. Diaz coached the school's MATHCOUNTS competition team for 18 years, bringing many honors and awards to the school as one of the premier math competitive teams in the State of Maryland. Teams from Gov. T.J. Middle finished in top places countless times, and nine students at various times advanced to the MATHCOUNTS National Competition. In 1995, Mr. Diaz was awarded the Washington Post Outstanding Teacher Award for Frederick County. In 2006, Mr. Diaz was appointed by Gov. Robert L. Ehrlich, Jr., to the Board of Trustees of Frederick Community College, and is currently serving as Chairman of the Board.
Joseph Hawkins	Joseph A. Hawkins is a Senior Study Director at Westat in Rockville, Maryland. Prior to his Westat employment, Mr. Hawkins was an evaluation specialist in the Department of Educational Accountability at

	the Montgomery County Public Schools in Maryland, where he managed school-based research and evaluation studies. During his 19-year career with the school district, his research covered a wide variety of topics, such as student discipline, curricula, teacher training and induction, graduate follow-ups, technology, and school reform. Mr. Hawkins was also an elementary school teacher in the Peace Corps, and a preschool teacher and community youth organizer at a Washington, DC, settlement house. He has also taught developmental reading at both Howard University and Prince George's Community College (Maryland). His publications include newspaper columns, book chapters, and journal articles on equity, racism, and intolerance. "Teaching Tools," a column written by Mr. Hawkins for Teaching Tolerance Magazine and published by the Southern Poverty Law Center, won the 1994 EdPress Association of America Distinguished Achievement Award. Additionally, he served on the Board of Directors of the Montgomery County Education Association (an affiliate of the National Education Association), and he currently serves on the Board of Directors of TransCen, Inc., a national nonprofit organization that helps adults with disabilities find and maintain meaningful employment.
Dr. Betty Morgan	Dr. Morgan has been superintendent of the Washington County, Maryland, Public Schools, which serve 21,895 students, since 2001. She previously served as chief academic officer of the Baltimore, Maryland, Schools, and has served successfully in four counties in Maryland. She received her bachelor's and master's degrees from Queens College, a certificate and professional diploma from Hofstra University, and her Ph.D. from American University, Washington, DC. Morgan was recognized for increasing the graduation rate and reducing the dropout rate in Washington County through the development of a student-focused strategic plan. Under her direction, test scores have steadily increased each year, particularly for minority and poverty groups, and the school system has achieved Adequate Yearly Progress in all schools and in all areas. She received a State Senate award for "Leadership in Gifted and Talented Education," was inducted into the "Circle of Excellence" of Maryland's Top 100 Women, and was named Washington County's "Person of the Year" in 2007. Dr. Morgan speaks regularly at the State and National level on school improvement and transformation, the arts in education, and how to develop "world class" schools. In 2010, Dr. Morgan was selected as the National Superintendent of the Year by the American Association of School Administrators.[13]
Dr. Sandra Stotsky	Sandra Stotsky is Professor of Education Reform in the Department of Education Reform at the University of Arkansas and holds the 21st Century Chair in Teacher Quality. From 2004 to 2006, she was a Research Scholar in the School of Education at Northeastern University. From 1999 to 2003, she was Senior Associate Commissioner at the Massachusetts Department of

[13] http://www.aasa.org/content.aspx?id=11102, accessed January 18, 2010

	Education. During that period, she directed complete revisions of the state's licensing regulations for teachers, administrators, and teacher training schools, the state's tests for teacher licensure, and the state's PreK-12 standards for mathematics, history and social science, English language arts and reading, science and technology/engineering, early childhood (preschool), and instructional technology. She planned and directed two major research projects on middle school mathematics education and a number of research reports on various curricular areas in PreK-12. In addition, she planned and directed statewide conferences for the Department on history education, character education, mathematics education, and Structured English Immersion. She also helped to shape policies on teacher professional development and license renewal, and supervised the review of proposals from school districts for state and federal funds for professional development activities. From 1984 to 2000, she was a research associate at the Harvard Graduate School of Education affiliated with the Philosophy of Education Research Center (PERC). For 12 years, she directed a summer institute on civic education at the Harvard Graduate School of Education, sponsored by the Lincoln and Therese Filene Foundation. From 1991-1997, she served as editor of *Research in the Teaching of English*, the research journal sponsored by the National Council of Teachers of English. On a consultant basis from 1992 to 2002, she worked for the United States Information Service and the U.S. State Department on the development of civic education programs in Poland, Lithuania, Ukraine, and Romania with educators and ministry officials from Eastern Europe. She has taught elementary school, French and German at the high school level, and undergraduate and graduate courses in reading, children's literature, and writing pedagogy. She is editor of *What's at Stake in the K-12 Standards Wars: A Primer for Educational Policy Makers* (Peter Lang, 2000) and author of *Losing Our Language* (Free Press, 1999, reprinted by Encounter Books, 2002). Her publications address many areas and disciplines in education and include "School-related influences on grade 8 mathematics performance in Massachusetts"(*Third Education Group Review*, 2005) and *Progress in Mathematics* Research Base (a 2005 review of mathematics education research and related reading research, for W.H. Sadlier, Inc.). She currently serves as Chair of the Sadlier-Oxford Mathematics Advisory Board, member of the Advisory Board for the Advanced Math and Science Academy Charter School, Marlborough, Massachusetts, member of the Advisory Board for the Shimer University Core Knowledge Educational Initiative, member of the Advisory Board for Pioneer Institute's Center for School Reform, and member of the Advisory Board for the Carus Publishing Company. She is also on the ERIC Steering Committee for the U.S. Department of Education Institute of Education Sciences. She served on the Steering Committee for the National Assessment of Educational Progress (NAEP) reading assessment framework for 2009. She received a B.A. degree with distinction from the University of Michigan and a doctorate in reading

	research and reading education with distinction from the Harvard Graduate School of Education[14]
Dr. W. Stephen Wilson	W Stephen Wilson is a Professor of Mathematics at the Johns Hopkins University. He has been Chair of the Department of Mathematics. His 1972 Ph.D. in mathematics is from M.I.T. He spent 8 months of 2006 as the Senior Advisor for Mathematics, Office of Elementary and Secondary Education, United States Department of Education and was one of the coauthors of the Fordham Foundation Report: The State of State MATH Standards, 2005. He helped revise the Washington State K-12 mathematics standards and evaluate textbooks for the state. He has helped out with numerous smaller projects on standards, curricula, and textbooks. More recently he reviewed drafts of the new Common Core Mathematics Standards for the National Governors Association and the Council of Chief State School Officers and is the author of the mathematics portion of the October 2009 Fordham Institute report "Stars by which to Navigate? An Interim Report on Common Core, NAEP, TIMSS, and PISA". He has over 60 research papers in mathematics, specializing in algebraic topology.
Vern Williams	Vern Williams received a BS in math education from the University of Maryland in 1972. He has taught math in the Fairfax County Virginia Public School system for over thirty years and has taught students in the Longfellow Middle School's gifted and talented program for over twenty-five years. In 1990, he was the Fairfax County Schools teacher of the year and received two national awards for distinguished teaching from the Mathematical Association of America. For 14 years, Williams was a Mathcounts coach. During that time, his teams received regional, state, and national awards. He also developed the Honors Math 7 curriculum for gifted Longfellow Middle School seventh graders which includes concepts from number theory, set theory, mathematical logic, analytic geometry, sequences and series, linear systems, and elementary calculus. Additionally, he developed the curriculum for the combination Algebra/Geometry course for gifted eighth grade students who receive two high school credits upon completion of the course. From 1994-2000, Williams taught Math Reasoning for The Johns Hopkins Center for Talented Youth Summer Program. And for the past three years he has been a curriculum advisor for Honors Test Prep LLC, a company that offers specialized SAT prep courses for very able high school students. In 2006, he started Math Enrichment Services LLC, a company that provides math enrichment for gifted upper elementary and middle school students. Williams's special interest is teaching traditional and rigorous mathematics to gifted middle school students. He currently teaches Honors Math and the combination Algebra/Geometry course at Longfellow Middle School in the McLean area of Fairfax County.[15]

[14] http://www.ed.gov/about/bdscomm/list/mathpanel/bios/stotsky.html , accessed December 2, 2009
[15] http://www.ed.gov/about/bdscomm/list/mathpanel/bios/williams.html, accessed December 2, 2009

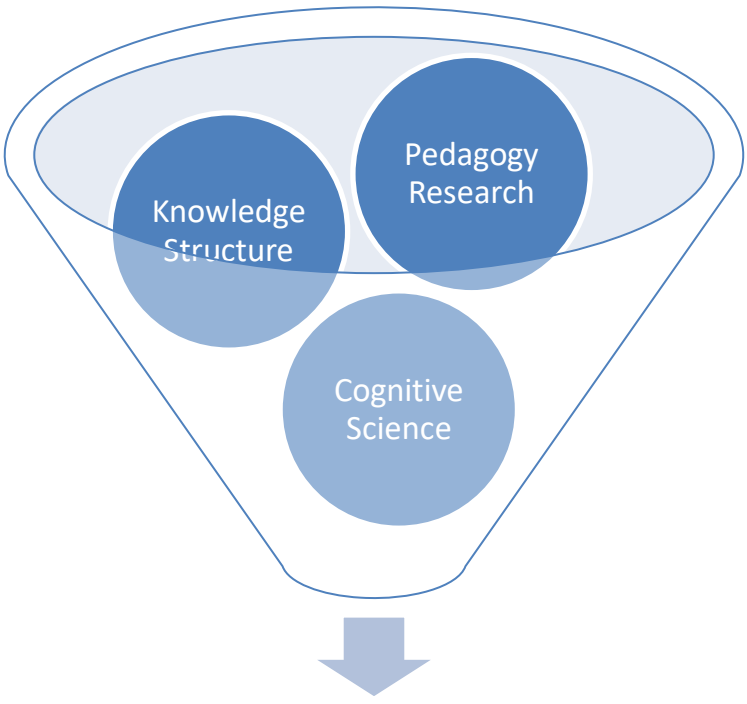
In addition to the other responsibilities previously outlined, the school's management team will also be responsible for creating and maintaining a culture focused on high standards of conduct, academic achievement, and research. The key aspects of the school's culture are outlined below, and are derived from other schools and academic approaches with track records of success. Additional aspects of the school's culture will arise from the unique viewpoints, beliefs, and attitudes of the staff. We encourage those ideas to be codified into mottos or other statements that can be used in classrooms and shared with the school community.

Area	Belief or Attitude	Practices Management Fosters
Achievement	"If the student hasn't learned, the teacher hasn't taught."[16]	The principal and teachers will look first to instructional delivery and lesson plans as causes for student underperformance, and regard the well-delivered lesson as the heart and soul of educational progress.
	"If it is worth teaching, it is worth teaching to mastery."[17]	Teachers expect students to master each topic presented, not just gain exposure to it. Instruction is intended to give students confidence as a result of mastery.
	"Motivation begins with success."[18]	Instruction should be designed so that all students—regardless of starting skill level—experience success starting with their first lesson.
	"Climb the mountain"[19]	Teachers use this phrase to encourage their students. Education is a mountain. Like all mountains, it must be climbed one step at a time. Why do you climb the mountain? To see the view.
	"There are no shortcuts"[20]	Teachers use this phrase to encourage their students to work hard and to understand that success is the product of hard work.
	The thrill of skill.	The phrase "drill and kill" is sometimes used to deride practice as dull and boring. Teachers use this phrase to encourage students to practice so they can experience the thrill of fluently applying a hard-earned skill.
Conduct	You can't beat the "triangle".	The Frederick Classical Charter School is a partnership among parents, students, and staff. All three sign a statement of commitment to do whatever it takes to help students learn.[21]
	Books, not looks.	All students must wear the school uniform.[22] How students look should not be a source of competition or status.
	Students come first.	Staff should continually ask "How does this help students?", and eliminate activities that don't. The needs of children trump bureaucratic hurdles created by adults.
Research	Research trumps philosophy.	Evidence is valued over philosophy, feelings, or strongly held beliefs. Staff will make decisions based on data and evidence.
	Ask the seven "whys".	When examining a course of action or issue, staff will ask "why" seven times to make underlying assumptions and beliefs explicit, and evaluate them before making a decision.

[16] This phrase comes from Zig Engelmann, author of Reading Mastery.
[17] Paraphrased from http://www.brainsarefun.com/Teachtk.html
[18] See http://www.brainsarefun.com/words.html
[19] This slogan comes from the Knowledge Is Power Program.
[20] This slogan comes from Rafe Esquith. See http://www.amazon.com/There-Are-Shortcuts-teacher-winner-Award-inspires/dp/0375422021
[21] The specific wording of the contract will be determined by the Governing Council after the school's approval, but will be similar to the "Commitment to Excellence" used by the Knowledge Is Power Program. See http://www.kipp.org/01/commitment.cfm
[22] The school uniform(s) to be worn will be decided by the Board of Trustees after the school's approval.

Appendix B – Pedagogy

The pedagogical techniques used at the Frederick Classical Charter School come from three main sources: the structure of the knowledge to be taught, pedagogy research, and cognitive science. The research-based teaching principles and techniques deriving from these areas are described below. It is important to note that this list is not comprehensive, nor is it intended to be limiting. It describes key practices and principles employed at the school that are applicable in a variety of situations, but not necessarily all situations. Both research and teachers' experience will determine which techniques will be used to teach specific topics. It is important to note that teachers cannot "mechanically employ empirically-supported principles and techniques, and thereby miraculously be transformed into 'effective teachers'." (Ellis, p. 3)



Knowledge Structure

Subject	Organization of Discipline's Knowledge
Reading & Handwriting	The knowledge structure for reading is arranged in a sequence that begins with oral speech and progresses to print. Phonemic awareness instruction develops students' ability to hear and manipulate speech sounds apart from any connection to the written word. Phonics connects the sounds students know to the various spellings. Phonics is not viewed as a teaching technique per se, but as important knowledge to be acquired. Knowledge of the structure of English orthography goes beyond sounding out letters and letter combinations to the layers of the English language (Anglo-Saxon, Greek, and Latin), word origins, and the history of English. Handwriting is taught in an "elements first" sequence, beginning with simple strokes and progressing to more complex figures, and complements reading instruction by helping students to identify letters.
Math	The knowledge structure of math is hierarchical from elementary school through high school. The entire K-12 sequence is an extended logical argument that begins with counting and place value, which form the basis of the standard arithmetic algorithms. This builds to algebra, which is a generalization of arithmetic, and on to calculus, which studies the limits, derivatives, and integrals of algebraic functions. The entire sequence rests on a foundation of computational skills learned in elementary school that are extended though simple, elegant logic to form more advanced mathematical structures.
Chemistry	The knowledge structure of chemistry is organized around a single "big idea": the atomic theory. Students begin by observing the properties of objects, the states of matter, and learn the idea of the atom. After learning about electricity and charges, students learn about neutrons, protons, electrons, and quarks. This builds to a more detailed understanding of the atomic theory based on the periodic table of the elements, molecules, types of chemical bonds, and, lastly, the Law of Conservation of Mass and how to balance simple chemical equations.
Biology	The knowledge structure of biology is organized around a single "big idea": the theory of evolution. Students begin by observing the common physical features of plants and animals and their habitats. Learning about single cell organisms leads to a broader discussion of cells, including their anatomy and reproduction. This leads to genetics and DNA, which provide the background knowledge needed to understand the theory of evolution.
Physics	For grade K-8 education, the knowledge structure of physics is based on classical mechanics, thermodynamics, and electromagnetism. Students first learn the concepts of force, acceleration, gravity, and electricity. This leads to the "big ideas" of mechanics as expressed in Newton's Laws of Motion and Law of Universal Gravitation. The "big ideas" of thermodynamics are the conservation of energy and the entropy law. The "big idea" of electromagnetism is that there is a force in nature that underlies both electricity and magnetism. Students build their knowledge of each of these areas, and are introduced to physicists' ultimate "big idea"—the search for a unifying force and theory that explains how all of the physical phenomena in the universe work.
Earth Science	The knowledge structure of earth science starts with understanding the major geological features of earth, its place in the solar system, galaxy, and universe, and the "big idea" of the Big Bang theory as an explanation of the origins of the universe. The "big idea" of plate tectonics explains the earth's physical features, and students learn how the earth's rotation creates the planet's electromagnetic properties. The earth's various cycles (photosynthesis and respiration, nitrogen cycle, carbon cycle) are driven by the sun and are the "big ideas" explaining the earth's surface phenomena.
Humanities	The chronological study of history is the organizing structure for all of the humanities. The literature, art, and music students study will include selections from the time period they are studying in history. Common themes across all disciplines are emphasized, along with the "big ideas" (structure of government, spreading of ideas through trade, etc.) whose explanatory power provides a framework for understanding each time period. For art and music, students will learn through an "elements first" sequence beginning with simple techniques and ideas that build to more complicated forms.
Spanish	The knowledge structure of Spanish mirrors the sequence in which one's native language is learned, beginning with oral vocabulary about everyday objects and events, and proceeding toward formal grammar and literature study. In addition to language skills, students learn Spanish history and culture through the same "big ideas" approach as for the humanities.

Pedagogy Research

Pedagogical Principle or Technique	Reference
Faultless Communication • Communication to students should be logically faultless, and prevent students from making inaccurate generalizations by ensuring that students will only draw the intended conclusion from the material presented.	(Engelmann, 1991)
Student Engagement • Instruction should be designed so that students experience high rates of success. • Teachers should move at a brisk pace to maximize student engagement. • Teachers will be more effective if they use a consistent signal to indicate the beginning of the lesson and then wait to gain students attention prior to proceeding. • Effective teachers are enthusiastic, motivated teachers, and are interested in both the subject matter and the dynamics of presenting the subject matter.	(Ellis, pp. 17, 80-81)
Content Coverage/Opportunity to Learn • Teachers highly value academics and place a strong emphasis on the attainment of academic goals by communicating their expectations. • Students must have enough time to master the material prior to moving on to the next topic.	(Ellis, pp. 23, 25)
Grouping for Instruction • In general, whole or large group instruction has been recognized as the most effective and efficient instructional approach to teaching basic skills. • Individualization is desirable, and can occur through small groups and through differentiated activities in addition to whole group instruction.	(Ellis, p. 27)
Scaffolded Instruction • Students can become independent, self-regulated learners through instruction that is deliberately and carefully scaffolded. • Teachers should design instruction to address students' "zone of proximal development"—problems and activities that students can complete with assistance that are neither too difficult nor too easy.	(Ellis, p. 30)

Addressing Forms of Knowledge
• The critical forms of knowledge associated with strategic learning are declarative knowledge, procedural knowledge, and conditional knowledge. Each of these must be addressed if students are to become independent, self-regulated learners.
• Declarative knowledge refers to facts and concepts, procedural knowledge refers to knowing how to perform a cognitive strategy, and conditional knowledge means knowing when to use a specific strategy.
• In general, within a body of knowledge, there are four main forms of knowledge. These are listed below, along with an example of a teaching strategy for each form.
  ○ Verbal associations – Model the association and have students practice it.
  ○ Concepts – Present examples and non-examples of the concept, and test students on examples and non-examples.
  ○ Rule Relationships – Present the rule relationship and have students practice examining examples to determine if the rule applies to the example.
	(Ellis, p. 35)
	(Kozloff, 2006)

○ Cognitive Strategies – Review any pre-requisite skills and then teach students the steps in the routine that use these skills, giving many opportunities to practice on a wide variety of examples.	
Activating and Organizing Knowledge • Learning is increased when teaching is presented in a manner that assists students in organizing, storing, and retrieving knowledge. • The likelihood that information can be retrieved and utilized effectively is largely dependent upon the depth of processing in which learners have engaged. • Specific content knowledge is important to enable thinking and problem solving, but this knowledge should not be taught in a rote, highly context-specific manner. • Teaching conditional knowledge is important to improve knowledge transfer to non-routine situations, as is giving students opportunities to apply their knowledge. • Graphic organizers, advance organizers, and semantic networks can help students organize their knowledge. • During instruction, teachers can use organizing words (first, second, etc.), cue students that some information being presented is critical, use explicit words to make connections among topics, and make expectations explicit to students.	(Ellis, pp. 38-58)
Making Instruction Explicit • Didactic models of instruction such as direct instruction, mastery learning, and precision teaching have been found to be superior to heuristic models, such as discovery learning, in promoting student achievement. • Students have to process new material by elaborating, reviewing, rehearsing, summarizing, or other processing in order to transfer it from working memory to long-term memory. • Extensive practice and frequent review are needed after the material is first learned so that it can be recalled effortlessly and automatically in future work. • When prior learning is automatic and fluent, this frees space in students' working memories which can be used for applications and higher-level thinking. • Effective teachers routinely engage in the following: ○ Begin each lesson with a concise statement of goals and a short review of previous and/or prerequisite skills. ○ Present new information in small steps with practice following each step. ○ Give clear and detailed instructions and explanations. ○ Provide active practice for all students. ○ Ask many questions, checking for student understanding. ○ Guide students throughout initial practice. ○ Provide systematic feedback and corrections in a timely manner. ○ Provide explicit instruction and practice for seatwork. ○ Continue to provide practice until students are fluent and confident.	(Ellis, pp. 68-69)
Teaching Sameness in the Curriculum • By providing students with numerous examples of structural sameness, students may begin to generalize through presentations of examples "of the particular". • Through the identification of structural sameness within and across subjects, teachers can eliminate students' uncertainty about new and unknown topics, help students make associations in their cognitive structures, and teach more in less time.	(Ellis, p. 72)

• Teachers can facilitate the teaching of sameness by utilizing metaphors and analogies to communicate key ideas. This technique appears to be most effective when: o They are explicitly used as cues to prompt recall o Two or more analogies or metaphors are used to illustrate a specific concept o Students are provided with multiple opportunities to use analogies and metaphors to solve problems.	
Teaching Vocabulary and Other Aspects of Meaning • Teachers should choose words for direct teaching that are central in a semantic field. • Teach word meanings in relation to other words that are known. • Use linguistic and situational context to develop word knowledge. • Teach both denotative and connotative meaning. • Teach multiple meanings for the same word. • Teach idioms, metaphors, and other figures of speech. • Identify the referents for nouns, pronouns, and phrases.	(Moats, 2000, pp. 126-128)
Student Centered vs. Teacher Led Instruction • Both teacher-led and student-centered instruction can be effective in promoting transfer, and teachers should not presume that student-centered approaches lead to deeper understanding and generalization than teacher-led approaches. Research on early science instruction found that students who reached the highest levels of competency displayed equal ability in terms of transfer regardless of how they had been taught, and that more students taught by direct instruction reached the highest levels. • Minimally guided instruction is less effective and less efficient than instructional approaches that place a strong emphasis on guidance of the student learning process. The advantage of guidance begins to recede only when learners have sufficiently high prior knowledge to provide "internal" guidance. When students learn science in classrooms with pure-discovery methods and minimal feedback, they often become lost and frustrated, and their confusion can lead to misconceptions. • For novices, studying worked examples seems invariably superior to discovering or constructing a solution to a problem. Research on math found that students learned more by studying algebra worked examples than solving the equivalent problems, and this effect held up regardless of the materials used or learner's characteristics. • Long-term memory is the central, dominant structure of human cognition. Everything we see, hear, and think about is critically dependent on and influenced by our long-term memory. The goal of learning is to make changes in long term memory. All problem-based searching makes heavy demands on working memory. This working memory load does not contribute to the accumulation of knowledge in long-term memory because while working memory is being used to search for problem solutions, it is not available and cannot be used to learn. • Problem-solving search overburdens limited working memory and requires working memory resources to be used for activities that are unrelated to learning. As a consequence, learners can engage in problem-solving activities for extended periods and learn almost nothing. • Cooperative learning is intended to complement teacher directed learning, and has an extensive research base. Cooperative learning is more than simply group work on projects. Two elements are crucial to its success: group goals and individual accountability. When group goals and individual accountability are clear, achievement effects of cooperative learning are consistently positive. Teachers must be aware of the potential for "ganging up" and "free rider" group dynamics.	(Klahr, 2004) (Kirschner, 2006) (RAND Corporation, 2006) (Pacific Research Institute, 2001) (Grossen)

• Although no method, whether teacher-centered or student-centered, is perfect for everyone, research clearly shows that on a wide array of indicators teacher-centered methods are more effective than student-centered methods in increasing student learning and achievement. More research is needed to determine which specific topics or specific learner characteristics are best addressed by one method over the other or by a combination of methods.	
Avoidance of Teaching Myths • The Myth of Process – Engaging in the educational process is valuable, but not an end in itself. "Learning how to learn" should not be valued more highly than acquiring knowledge and skills, since the two are intertwined. Students must be taught; learning does not occur "naturally" but requires careful instruction by teachers. • The Myth of Fun and Interesting – The entertainment value of a lesson and the level of student engagement should not be the measures of a lesson's success. Rather, attaining specific learning outcomes is the proper measure. Learning is not effortless—it requires hard work. Behavior management skills are more effective in motivating student learning than fun activities. Though there is nothing wrong with making lessons interesting, too many activities or those of questionable value end up reducing students' opportunity to learn. Supposedly "fun" activities often waste time, divert students' attention from the important substance of the lesson, cease to be interesting after a short period of novelty, and avoid the practice necessary for students to achieve real competence. • The Myth of Eclectic Instruction – This myth refers to relying on a variety of methods and instructional materials that are pieced together by the teacher instead of relying on a single set of lesson plans that are well-researched and coherent. Teaching is artful, but designing a set of validated lesson plans is very technical and involves extensive field testing. Eclectic teaching may provide an outlet for teachers' creativity, but validated lessons that are based on careful analysis and research work best when teachers follow them exactly. Though no single curricular approach works for all students, some practices are better than others, and there is a high probability that validated lessons will work better than the alternatives for most students. When teachers piece together an instructional program from various sources, the components of the programs may not work together. • The Myth of "Good" Teachers – This myth is based on the idea that good teachers are the most important variable in students' success—outweighing teaching techniques, curriculum, school climate, organization, and leadership. Just because a teacher has dispositions well suited to teaching and a commitment to students and to a particular teaching approach doesn't mean students will learn. Large scale research is a reliable guide to instructional approaches that will help teachers reach more children. Good teachers are made, not born, and making good teachers requires professional development in specific knowledge and skills. When curricula are ineffective, students won't learn, regardless of how dynamic or well-organized the teacher is. • The Myth of Disability – This myth is that children who can't seem to learn and apparently won't behave have some kind of learning disability, socioeconomic status, or minority status that accounts for the students' academic and behavioral problems. Labeling provides an excuse for the teaching profession, and is a dangerous trap for students. Without a clear focus on educational goals and effective teaching practices, teaching failures may be incorrectly identified as student failures. The majority of students in special education have mild, not severe, disabilities, and some disabilities are non-academic. There is seldom any objective evidence to justify the presumption that special education students have an intrinsic neurological dysfunction. Most reading disabilities, which are the cause of more than half of all referrals to special education, can be prevented or eliminated through early intervention. Rather than look to students as the cause of failure, schools should focus on what they can control to improve student outcomes. Excellent schools can enable low income and	(Snider, 2006)

other at-risk students to achieve at high levels.	
Presentation Techniques • Model-Lead-Test – Teachers first model the skill to be learned, then lead students through the skill, and then test students to ensure they can perform it independently. This technique can also be used as a way to correct student mistakes in a positive manner. • Communicating Through Examples – It is impossible to teach a concept through the presentation of one example. It is impossible to present a group of positive examples that communicates only one interpretation. Any sameness shared by both positive and negative examples rules out a possible interpretation. A negative example rules out the maximum number of interpretations when the negative example is least different from some positive example. To make this sequence of examples as clear as possible, use the same or similar wording on juxtaposed examples. To minimize the number of examples needed to demonstrate a concept, juxtapose examples that share the greatest number of features. To show differences between examples, juxtapose examples that are minimally different and treat the examples differently. To show sameness across examples, juxtapose examples that are greatly different and indicate that the examples have the same label. To test the learner, juxtapose examples that bear no predictable relationship to each other. • Introducing Coordinate Members to a Set – Arrange members so that highly similar members are separated by two or more non-similar members. Separate introductions that involve minimum difference by at least one introduction that does not involve minimum differences.	(Carnine, 1991, pp. 37-43, 111)

Cognitive Science

Pedagogical Principle or Technique	Reference(s)
The Challenge of Thinking • The brain is not designed for thinking. Humans resort to thinking when they can't solve a problem by remembering how they solved the same or similar problem in the past, or are motivated to think because they perceive a problem as being solvable and is likely to give them the rush that comes with successfully solving it. • Design instruction to present problems that are just hard enough for students to find them interesting, but not too hard that students won't engage in them. • The lack of space in working memory is a fundamental bottleneck of human cognition. Instruction should not overwhelm students' working memories.	(Willingham D. D., Why Don't Students Like School?, 2009, pp. 3-8, 15, 83) (Willingham D. D., Inflexible Knowledge--The First Step to Expertise, 2002)
Knowledge and Critical Thinking • Factual knowledge precedes skill. The knowledge base necessary to engage in critical thinking must mostly be in place prior to asking students to engage in critical thinking. • Factual knowledge improves your ability to gain more knowledge. • Shallow knowledge is better than no knowledge. The initial stages of learning involve students acquiring inflexible knowledge, which is different than rote memorization. Inflexible knowledge is an important step toward developing expertise, which can be developed by acquiring more knowledge, seeing more examples, and practicing more. • Knowledge and skills can be decomposed into smaller units that can be mastered independently.	(Willingham D. D., 2009, pp. 19, 32, 37) (Andersen, 2000)
Memory • Memory is the residue of thought. Design assignments so that students will unavoidably think about the meaning you want them to learn. • Stories are psychologically privileged and are treated differently in memory than other kinds of material. Organizing lesson plans around the four elements of stories—causality, conflict, complications, and characters—can in some cases be an effective technique. • In the unusual case where the material to be learned has little inherent meaning, use mnemonic methods to help students remember the material.	(Willingham D. D., 2009, pp. 41, 51, 58-59)
How Students Develop Deep Understanding • Students understand new things in the context of what they already know, and most of what they know is concrete. • Understanding is remembering in disguise. • Examples used to explain abstract ideas must be familiar to students. • Recognize that, when students are first introduced to a topic, they will tend to pay attention to its surface structure, and not its deep structure. • Make deep knowledge the emphasis, but set realistic expectations for what can be achieved.	(Willingham D. D., 2009, pp. 67-68, 79)
Practice • It is virtually impossible to be proficient at a mental task without extended practice. • Practice makes memories long lasting and improves transfer. • Distributed practice promoted retention better than massed practice.	(Willingham D. D., 2009, pp. 81, 87, 91, 94)

• Fold practice into more advanced skills.	
Developing Expertise • Cognition in early training is fundamentally different than cognition late in training • Expert's memories are organized differently than novice's memories • Students are ready to comprehend, but not to create knowledge. • Activities that are appropriate for experts may sometimes be appropriate for students, but not because they do much for students cognitively.	(Willingham D. D., 2009, pp. 97, 101, 107-110)
Learning Styles • Children are more alike than they are different in terms of how they think and learn. • Teach in the content's best modality.	(Willingham D. D., 2009, pp. 114, 126)
Motivation • Intelligence can be changed through sustained hard work • Treat failure as a natural part of learning • Don't praise second-rate work for lower performing students. • Praise should emphasize process, not ability • Treat motivation problems as instructional problems, not as issues with the child.	(Willingham D. D., 2009, pp. 132, 143, 144-145) (Willingham D. , How Praise Can Motivate--Or Stifle, 2005-2006) (Willingham D. , Should learning be its own reward?, 2007-2009) (Crawford, 2007)