

# The Gatton Academy:

## A Case Study of a State Residential High School With a Focus on Mathematics and Science

Julia Link Roberts, EdD<sup>1</sup>

**Abstract:** This article describes the Carol Martin Gatton Academy of Mathematics and Science in Kentucky, a residential high school for juniors and seniors supported by the state budget. The school opened in 2007 after 10 years of advocacy and planning, including the retrofitting of Schneider Hall to be the home of the Gatton Academy and The Center for Gifted Studies at Western Kentucky University. Students at the Gatton Academy earn a minimum 60 college hours and a high school diploma. This article describes the mission, the curriculum, benefits to the sending school and school district as well as to the student, support for students, and the recognition for students and the Gatton Academy. This special school is 1 of 15 state residential high schools with a focus on mathematics and science that are supported by the state budget.

**Keywords:** acceleration, advocacy, gifted education, special school programs, STEM

State residential high schools of mathematics and science come in two models: (a) free-standing, self-contained schools offering traditional high school honors and Advanced Placement Classes, dual credit classes, and college classes and (b) schools located on college campuses with students taking only college classes. The North Carolina School of Science and Mathematics was the first state school with a focus on science and mathematics, starting in 1980 as the first of those two models. The Texas Academy of Mathematics and Science pioneered the model of locating a school on a college campus and having students take only college classes, and it began in 1987. There are now a total of 15 state residential high schools with a focus on mathematics and science funded by the state legislatures (Table 1).

### Getting the School Started

The focus of this case study will be one of the most recent residential schools to open—the Carol Martin Gatton Academy of Mathematics and Science in Kentucky which opened its doors in the fall of 2007 to 120 high school juniors and seniors from across the Commonwealth of Kentucky. The Gatton Academy is located on the campus of Western Kentucky University. That fall, the first classes of students moved into Schneider Hall, a residence hall renovated specifically to be the home of the Gatton Academy and The Center for Gifted Studies. Ten years of advocacy preceded the beginning of the Gatton Academy, so it did not happen overnight. That 10-year period started with the presentation of a concept paper to the Council for Higher Education (now known as the Council of Postsecondary Education) and ended with the dedication of the Gatton Academy in mid-August in 2007.

During the period prior to the residential school in Kentucky becoming a reality, plans were made to build broad support for a state residential school with a focus on math and science. Of course, it was critical to build support among legislators as the school would need a budget. Visits with legislators focused initially on the leadership in the House and Senate. A leading supporter of the concept was the Speaker of the House, and his leadership was critical to last-minute negotiations before this specialized school was included in the state budget.

Gaining support from superintendents was also important. It was helpful to have opportunities to talk with superintendents, especially as a group, and such opportunities were afforded at luncheons during conferences held by the Kentucky Association of School Superintendents. Support was needed to get started, and support to maintain public interest continues to be essential for schools like the Gatton Academy.

Numerous strategies were implemented to build support. One important strategy was a visit to the Texas Academy



CAROL MARTIN GATTIEN  
ACADEMY OF MATHEMATICS & SCIENCE IN KENTUCKY

Table 1. State Schools, Their Locations, Year Beginning, and Websites.

Academy	Location	Website	Year
Alabama School of Mathematics and Science	Mobile, Alabama	www.asms.net	1989
Arkansas School for Mathematics, Sciences, and the Arts	Hot Springs, Arkansas	http://asmsa.org	1993
Georgia Academy of Aviation, Mathematics, Engineering, and Science	Middle Georgia College, Cochran, Georgia	www.mgc.edu/GAMES	1997
Illinois Mathematics and Science Academy	Aurora, Illinois	www.imsa.edu	1986
Indiana Academy for Science, Mathematics, and Humanities	Ball State University, Muncie, Indiana	www.bsu.edu/academy	1988
Kansas Academy of Mathematics and Science	Fort Hays State University, Hays, Kansas	www.fhsu.edu/kams	2009
Kentucky Academy of Mathematics and Science	Western Kentucky University, Bowling Green, Kentucky	www.wku.edu/academy	2007
Louisiana School for Math, Science, and the Arts	Northwestern State University, Natchitoches, Louisiana	www.lsmsa.edu	1982
Maine School of Science and Mathematics	Limestone, Maine	www.mssm.org	1995
Mississippi School for Mathematics and Science	Mississippi University for Women, Columbus, Mississippi	www.themsms.org	1987
Missouri Academy of Science, Mathematics, and Computing	Northwest Missouri State University, Maryville, Missouri	www.nwmissouri.edu/masmc/index.htm	2000
North Carolina School of Science and Mathematics	Durham, North Carolina	www.ncssm.edu	1980
Oklahoma School of Science and Mathematics	Oklahoma City, Oklahoma	www.ossm.edu	1990
South Carolina Governor's School for Science & Mathematics	Hartsville, South Carolina	www.scgssm.org	1988
Texas Academy of Mathematics and Science	University of North Texas, Denton, Texas	https://tams.unt.edu	1987

Source: Adapted from Roberts (2007).

of Mathematics and Science at North Texas University. The Texas Academy of Mathematics and Science was chosen for the field trip because the Kentucky academy would follow that model.

Included on this trip were the president of Western Kentucky University, deans of the College of Science and Engineering and the College of Education and Behavioral Science, a math professor, two superintendents of school districts, the development officer who would be working with the Academy, and the director of The Center for

Gifted Studies. All of the individuals who made this visit were ones who would field many questions about the proposed school and who would be important in convincing others that the statewide school would be important in creating a bright economic future for our state. (Roberts, 2010, p. 43)

Another strategy that influenced the final vote for the Academy centered on getting candidates for governor of Kentucky to make a statement of support for the proposed residential school. Two invitations were issued to the

gubernatorial candidates in 2003. The candidates were invited to come to Western Kentucky University and address the young people who were attending VAMPY (The Summer Program for Verbally and Mathematically Precocious Youth), a 3-week summer program for gifted 7th through 10th graders sponsored by The Center for Gifted Studies. One candidate accepted, and he was the one who was elected governor. The candidates were also invited to make a statement about the proposed academy with the promise that the statements would be published in the Kentucky Association for Gifted Education newsletter and *The Challenge*, the magazine of The Center for Gifted Studies. Then-Congressman Fletcher stated, "I believe that the proposed Kentucky Academy of Mathematics and Science is an important part of ensuring the future economic prosperity in our state" (Roberts, 2004, p. 1).

### The Mission

*The mission is to offer a residential program for bright, highly motivated Kentucky high school students who have demonstrated interest in pursuing advanced careers in science, technology, engineering, and mathematics. The primary goal is to prepare these exceptional young students for leadership roles in the Commonwealth.* The mission statement was key to successfully advocating for the establishment of a residential school with a focus on science, technology, engineering, and mathematics (STEM). The mission statement speaks to both educational and economic benefits for the Commonwealth of Kentucky. It is more convincing to decision makers to have economic goals as well as educational benefits for a residential high school with a STEM focus.

### The Curriculum

The curriculum for the Gatton Academy follows the model established at the Texas Academy of Mathematics and Science. Students take college classes, and most of their classes are ones in which the Academy students and other college students learn in the same classes. Professors at Western Kentucky University are the teachers, so they have the depth of knowledge to provide the challenge that advanced students need. The required curriculum includes three to four mathematics courses (beginning with the level of math they are prepared to take based on previous coursework and placement exam results); a course in biology, chemistry, and physics plus an additional course in one of those disciplines; a course in computational problem solving; STEM electives; two English courses; and classes to complete requirements for high school graduation in Kentucky (but taken as college courses). Academy students

graduate with a high school diploma and a minimum of 60 college credits.

All Academy students are issued a laptop with software required for their classes. Students are provided with the Academy experience at no cost for room, meals, or tuition. Books are purchased by their families or by the sending school which receives the per-pupil state funding for the Academy students.

### Support for Academy Students

One problem faced by some advanced students, including Gatton Academy students, is a lack of study skills. When school has not required students to develop study skills, some young people have a huge adjustment to make as they enter college. Some students seem to easily pick up the requisite skills and habits to become successful in college classes. Others struggle with the transition. Gatton Academy staff members offer sessions to teach study skills to facilitate a smooth adjustment to college classes. A week prior to the opening of the fall semester, incoming Gatton Academy students participate in activities to get to know fellow students and in sessions that prepare them for college classes.

Help for students does not stop there. Throughout the school year, tutors are available to assist young people in various courses. This support is offered at Schneider Hall, the residence hall for the Gatton

Academy. Study hours are required until incoming students demonstrate they are successful in their courses. In addition to tutors, Gatton students help each other. In fact, a highlight for them is having others who share their interests and provide support.

The Assistant Director for Counseling Services offers support for Gatton Academy students. The Assistant Director of Residence Life lives in an apartment in Schneider Hall and coordinates the residential part of Academy life. Resident assistants are another resource as they live among the students in the residence hall.

College recruiters visit Schneider Hall. Students have assistance as they prepare college applications. Staff members are available to help students throughout the college application process.

### Research

Although it is not a requirement for Academy students to engage in research, most of them do research under the mentorship of a professor. Each fall, a research fair features research opportunities available to Gatton Academy students.

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At that time, professors gather to talk with students about their research interests to give the Gatton Academy students the opportunity to know the research possibilities on campus. Ninety-one percent of the graduating class in 2012 engaged in research for one to four semesters.

In addition, summer provides a time for research opportunities. The gift from Mr. C. M. Gatton provides financial support for students doing summer research. Several students are involved with National Science Foundation (NSF) Research Experiences for Undergraduates (REUs) at Western Kentucky University and on other campuses. Students present their research on campus at research fairs and at state, regional, and national meetings; and a few publish their findings in professional journals.

Sam Saarinen, a Gatton senior in 2013, described his summer experience in the following way:

On the surface, this really is like what most high school students do with their summers. I have a job which I show up to every morning, I read in the afternoons, and I pursue my hobbies on the weekends. Except that my job is thinking of things that nobody has ever thought of before, the books I read are mostly on knot theory or computer programming, and my hobbies include designing fonts, creating videogames, and studying great works of art. (Jenkins, 2012, p. 53)

Gatton Academy students conduct research in the areas of biology, chemistry, physics, astronomy, engineering, geology, mathematics, computer science, architecture, agriculture, and psychology. Research spans a wide range of topics. For example, Clarice Esch, class of 2011 and a Barry M. Goldwater Scholarship awardee, has focused her research on finding alternative fertilizer sources (Gott, 2012). Sarah Schrader, class of 2011, Presidential Scholar and a Barry M. Goldwater Scholarship awardee, has conducted research in biochemistry and is currently at Western Kentucky University (Gott, 2012). She is fluent in Chinese after being involved in the Chinese Flagship Program, and she has spent this academic year in a research internship in China.

Gatton Academy students get information about internship opportunities. Students and parents are regularly provided information about summer opportunities by the Assistant Director of Academic Services. Summers are filled with research and internship opportunities in locations both close to students' hometowns and throughout the world.

### Global Experiences

For the 2011 and 2012 classes, 75% of the students at the Gatton Academy participated in travel experiences to various parts of the globe during their 2 years at the Gatton Academy. Annually students have opportunities to travel in Europe or conduct research in Costa Rica during the January term. Summer offers time to study at Harlaxton College in Grantham, England. Individual Academy students have spent

time in China, Morocco, Germany, South Africa, and Taiwan in language and research opportunities. Western Kentucky University hosts a Confucius Institute and a Chinese Flagship program, so there are various opportunities to learn the Chinese language and travel to China. A STEM + Critical Language option offers the opportunity for students to specialize in Chinese or Arabic as they complete the curriculum at the Academy. An international perspective is considered important for Academy graduates.

### Social Activities

Gatton Academy students live together in a residence hall dedicated specifically to them. The building was retrofitted to meet the needs of adolescents who are living away from home. Residential counselors are professionals with earned college degrees who live on the wings with the students.

Community space is available in the student wings as well as on three floors of the building. The fourth floor provides a space that is large enough for the student body to meet for seminars, the research fair, and gatherings for all of the students for movies, dances, as well as for playing ping pong and hanging out with friends.

The lobby has lots of space for gathering with friends. A grand piano is a mainstay in that area, and it is often enjoyed by Gatton Academy students and staff. The lobby as well as the rest of the building features original pieces of art that have been donated by friends of The Center for Gifted Studies and the Gatton Academy.

Many activities are available for the Gatton Academy students throughout the academic year. Social activities are planned for the weekends. Just a few of the possible outings are trips to the Louisville Science Center, a ski resort in Indiana, a musical in Nashville, and an afternoon of ice skating. There are regular opportunities to go to movies and shopping in Bowling Green and for speakers, musical events, and ballgames on campus. A huge advantage of being located on a campus is the wide variety of events being offered on an ongoing basis. There is a winter dance during the first semester and a prom in the spring. In addition, students can attend the prom at their home high schools, too, as they are dually enrolled.

Students can participate in activities on campus with the exception of joining fraternities or sororities or playing varsity sports. They can play in the university band, and they can audition for other instrumental and vocal music opportunities on campus. They also have clubs typical of high schools such as Beta Club, chess club, and Odyssey of the Mind teams; and they participate actively in the Kentucky Youth Assembly with an Academy student being elected governor this year. In fact, they can start any clubs that interest them and for which they can get a staff sponsor. They enter various academic competitions, and recently the team won the U.S. Department of Energy's West Kentucky Regional High School Science Bowl and will be on the way to Washington, D.C., to compete in the National Science Bowl. Academy students can participate

in competitions open to college students and high school students as they qualify in both categories. They have been named finalists in the Siemens competition, winners of SMART Scholarships, and awardees of Barry A. Goldwater Scholarships.

## The Application Process

Applications for the Gatton Academy are completed online during the students' sophomore year of high school. Applying requires essays, transcripts, ACT or SAT scores, and letters of recommendation. The second phase of the application process involves interviews. Approximately 100 applicants are invited to come to the campus for interviews. The students to be interviewed are selected by looking at all of the pieces of the application in light of the opportunities provided by the home high school.

Demographically, the students at the Gatton Academy are half male and half female. Of course, equal representation of girls and boys is important, and the residence hall is designed to ensure that there will be equal numbers of boys and girls. There is a girls' side and a boys' side of Schneider Hall with community space between the spaces on each floor.

It is also important that the students at the Gatton Academy represent the state, so geography is considered in decisions about who to invite to be interviewed and who receive the final invitations to be members of the next class for the Gatton Academy. Thus far, 107 of Kentucky's 120 counties have had a student attend the Gatton Academy.

For each of the past 2 years, approximately 180 high school sophomores completed the application process. The vast majority of the applicants come from public schools throughout the state with a very few from private schools or a homeschool background. All of the applicants are Kentucky residents.

## Getting the Word Out About the Gatton Academy

An opportunity is not a real opportunity until a person knows about it. It is essential to plan numerous opportunities for residents across the state to learn about the Gatton Academy. It cannot be assumed that students will hear about the opportunity at school even though information is sent to all high schools in the state. Planned opportunities to disseminate information are essential if students with the need for more advanced learning opportunities are to know about the Gatton Academy.

The Assistant Director of External Relations and Admissions plans information sessions across the state in the fall. These evening sessions are publicized in the areas in which they will be presented. These sessions offer opportunities for parents and prospective students to learn about the Gatton Academy and to ask questions. The Director of the Gatton Academy also visits districts to talk about the Gatton Academy, often focusing on districts from which there have been no or few applicants.

Another way for people to learn specifics about the Gatton Academy is to attend a Preview Weekend. These are held twice in the fall and once in the winter at the Gatton Academy. Young people and their families spend a Saturday learning about the life of an Academy student from current students, the staff, and parents of former or current Academy students. These sessions provide an excellent opportunity to learn about life at the Gatton Academy.

Other ways to learn about the Gatton Academy are the website, social media, exhibits at professional conferences, and articles in magazines and journals. Online opportunities allow people to stay current on activities and offerings at the Gatton Academy. Articles in state publications have made information available to readers across the Commonwealth. Exhibits at professional meetings allow educators to learn about the Gatton Academy and to stay up to date with what Academy students are accomplishing.

Without a doubt, the best way to get the word out is by a person sharing a firsthand experience with a parent, prospective student, or an educator. Summer camp participants at SCATS (Summer Camp for Academically Talented Students) and VAMPY, which are offered by The Center for Gifted Studies, learn about the opportunity to apply for the Gatton Academy. Some of the campers live in Schneider Hall, and all of them have opportunities to become familiar with the Gatton Academy's residence hall as well as with the community.

## Benefits for the Sending School and School District

What will schools and school districts gain from having a student accepted at the Gatton Academy? Answers to this question were essential in building support for a state residential school. First, the student brings pride to the school and district for being accepted. As one superintendent said, "Wouldn't I be proud to have a student accepted at the Gatton Academy?" Second, the Gatton Academy can provide an alternate high school opportunity for students who are ready for more advanced academics than their high schools usually are able to provide. The district would not need to create the more challenging opportunity as the Gatton Academy provides a higher level of challenge than most traditional high schools. Third, students at the Gatton Academy participate in the state assessment and their scores are included with other scores at the sending high school. Not losing the scores of the Gatton Academy students is a big selling point for schools and districts during this time of high-stakes accountability. Fourth, the per-pupil funding for the student accepted at the Gatton Academy is retained in the school district. Fifth, the sending high school can celebrate the honors of the student who remains dually enrolled in the home high school and the Gatton Academy. After all, the student likely spent 10 or 11 years in that district which is a major reason for the student's academic success.

Keith Davis, superintendent of the Bullitt County School District, made this statement about the benefits the Gatton Academy offers to his school district.

There are at least two reasons that come immediately to mind for why I believe Gatton's presence in Kentucky is good for our Bullitt County Public Schools. First, it gives us another option on the continuum of services for our most gifted students. Second, the fact that we have had 13 students accepted into Gatton in the last 4 years indicates that our district is preparing our students to a level that allows them to compete with the best and the brightest that our state has to offer. We are proud of our current Gatton student and our past graduates and we look forward to the added value they bring to our community when they complete their education. (personal communication, February 25, 2013)

It is essential that the Gatton Academy is seen as valuable to education in the state and to school districts across the Commonwealth.

### Student Benefits From the Gatton Experience

What do Gatton Academy students gain from 2 years at this specialized school for mathematics and science? First, they earn a minimum of 60 hr of college credit and a high school diploma. Many of them earn up to 80 college credits during their 2 years at the Gatton Academy. Second, academic growth is another benefit for students. For example, the class of 2012 had a three-point gain on the ACT composite average during their 2 years at the Gatton Academy rising from 29.0 to 32.0. Third, research opportunities allow students to explore potential college majors and career interests. Fourth, they have ongoing opportunities to learn what they do not already know at levels of challenge that are appropriate for them. The students are advanced and ready to learn at levels of complexity that accelerate their learning which is a good match for college classes. Fifth, they live and learn with idea-mates, others who are equally interested in learning at high levels, especially in various disciplines of science and mathematics—engineering and technology, too. A peer group is so important for support and encouragement. Sixth, they have the 2 years at the Gatton Academy with room, board, and tuition included in the budget. Because these expenses are covered, the Gatton Academy is an opportunity open to all students in the Commonwealth from all income levels.

Gabe Smith, a member of the class of 2013, described his almost 2 years at the Gatton Academy.

The Gatton Academy is an environment like nothing I have experienced before. Academically, it provides an opportunity to take classes I would never have back home. Outside of academics, it has allowed me to befriend people in an environment that feels almost like home at the end of 2 years. (personal communication, February 23, 2013)

These comments highlight how important the advanced academics and opportunities to be with intellectual peers are for Gatton Academy students.

### Recognition for the Academy

During its first 5 years, the Gatton Academy has received national recognition. In 2012, *Newsweek* named the Gatton Academy the number one public high school in the country (Streib & Yarett, 2012). During the same year, the Gatton Academy was named by Intel as one of three high schools in the final competition for high schools of distinction in science (Gott, 2012). The *Washington Post* included the Gatton Academy in the list of Public Elites in 2009, 2010, 2011, and 2012 (Matthews, 2011). Such honors highlight that students excel when the learning ceiling is removed.

At the celebration of the number one ranking of the Gatton Academy by *Newsweek*, Governor Brashear made the following statement.

Too often we don't challenge our young people enough. The work here shows what happens when you make things more difficult, and you throw challenges at students and give them the tools to overcome those challenges. They soar. They soar. (Simpson, *The Challenge*, 2013, p. 13)

At the same occasion, David Brown, a member of the class of 2013, stated the following:

We learn from each other. We push each other, and, most importantly, we pick each other up when we fall . . . We are number one because no one is concerned with being number one. (Author, *The Challenge*, 2013, p. 13)

### Conclusion

*Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future* (National Academy of Sciences, Institute of Medicine, & National Academy of Engineering, 2007) recommended "statewide specialty high schools" (p. 6). This national report stated, "Specialty secondary education can foster leaders in science, technology, and mathematics" (p. 6). This report was a response to national legislators who requested recommendations "to enhance the science and technology enterprise so that the United States can successfully compete, prosper, and be secure in the global community of the 21st century" (p. 2).

Many larger city school districts offer magnet schools for students who are especially interested in careers in math and science and who are ready to learn at advanced levels. State residential schools make opportunities for advanced learning in STEM available for students from areas in which there are no such schools. Such a school allows them to engage in learning at levels at which most of their age-mates are not yet ready to learn.

The Gatton Academy is 1 of the 15 statewide, residential schools with a focus on science and mathematics supported by the state budget. It represents the model in which students live in a residence hall dedicated to the school and take college classes for the last 2 years of high schools. The Carol Martin Gatton Academy of Mathematics and Science in Kentucky is a special school that is preparing leaders in STEM.

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### Bio

*Julia Link Roberts, EdD, is the Mahurin Professor of Gifted Studies at Western Kentucky University. She is Executive Director of The Center for Gifted Studies and the Carol Martin Gatton Academy of Mathematics and Science in Kentucky. She is President of The Association for the Gifted (a division of the Council for Exceptional Children) and a member of the Executive Committee of the World Council for Gifted and Talented Children.*



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