Known for his vision, understanding and integrity, Floyd began his leadership in education as the commissioner of the Tennessee Department of Education and then as vice president for administration at Middle Tennessee State University. In the summer of 1986, he began his tenure at his alma mater, Tennessee State University, as chief administrative officer, and served as the second successive interim president in 1986. He was appointed by the Tennessee Board of Regents as the fifth president of the university.

In 1988, Floyd acquired property in McMinnville for the Tennessee State University Otis L. Floyd Nursery Research Center. The mission of the Nursery Research Center is to provide leadership in the strengthening and expansion of the regional nursery industry through research in the areas of pathology, entomology, genetics, horticulture and related sciences. Floyd placed a heavy emphasis on the need for science education.

Seeing a need for an expansion on campus to house a growing number of students and provide modern academic facilities, Floyd began to secure funds for a large renovation project. He was the instrumental force in acquiring $112 million for construction on the Master Plan project.

Construction projects began in 1989, and under Floyd’s plan, nearly all of the buildings on campus were renovated. Eight new buildings were constructed, including the Floyd-Payne Campus Center, the Ned McWherter Administration Building, the Wilma Rudolph Residence Center, and the Performing Arts Center.
Floyd served as president until June 1990, and transitioned to become the first African-American chancellor of the State Board of Regents for Tennessee from July 1990 until his death in 1993. In 1997, the Tennessee Board of Regents established the Dr. Otis L. Floyd Scholarship from proceeds derived from the sale of former Chancellor Floyd’s residence. The scholarship is still awarded to deserving students today, and students who receive the scholarship are charged with working to make an impact in education. The Tennessee College Public Relations Association also established the Otis L. Floyd, Jr. Award for Excellence in Administration in his honor.