

MINORITY STUDENTS GAINING ACCESS TO OPPORTUNITIES IN TRANSPORTATION ENGINEERING: A CASE STUDY

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Abstract $\frac{3}{4}$ Outreach programs to increase diversity in the university environment are an important element to stimulating underrepresented groups into the various engineering fields. The Eisenhower Historically Black Colleges and Universities (HBCU) Fellowship Program is one component of the Dwight David Eisenhower Transportation Program designed to provide funding to students interested in conducting research and pursuing careers in the area of transportation. This paper examines how the North Carolina Agriculture and Technical State University's HBCU Eisenhower Fellowship Program have been successful in encouraging minorities to pursue degrees in transportation related fields, facilitating undergraduate and graduate transportation research, and increasing the number of minorities that are employed in transportation related industries.

Index Terms $\frac{3}{4}$ Minority Fellowship Programs, Minority Research and Education, Transportation Engineering, and Transportation Research Opportunities.

INTRODUCTION AND OVERVIEW OF THE DWIGHT DAVID EISENHOWER TRANSPORTATION FELLOWSHIP PROGRAM

Outreach programs to increase diversity in the university environment are an important element to stimulating underrepresented groups into the various engineering fields. The Dwight David Eisenhower Transportation Fellowship Program was authorized by Section 6001 of Public Law 102-240, of the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 and reauthorized by Section 5104 of Public Law 105-178, of the Transportation Equity Act for the Twenty-First Century (TEA-21) of 1998. The Eisenhower Transportation Fellowship Program is Department of Transportation wide, was developed in the Summer of 1992, and encompasses all modes of transportation. The Historically Black Colleges and Universities (HBCU) Executive Order 12876 was signed on November 1, 1993 by President William Jefferson Clinton [5].

The Dwight David Eisenhower Transportation Fellowship Program has been designed to attract the nation's brightest minds to the field of transportation, to enhance the careers of transportation professionals by encouraging them to seek advance degrees, and to retain top talent in the U.S.

transportation industry. The program encompasses all areas of transportation and currently has six award categories [4]:

- **Eisenhower Faculty Fellowships (FF):** Provide faculty in transportation with opportunities to enhance and update their transportation knowledge, including attendance at conferences, courses, seminars and workshops.
- **Eisenhower Graduate Fellowships:** Enable students to pursue masters degrees or doctorates in transportation related fields at the university of their choice.
- **Eisenhower Grants for Research (GRF) Fellowships:** Acquint undergraduate and graduate students with transportation research, development and technology transfer activities at U.S. Department of Transportation facilities.
- **Eisenhower Hispanic Serving Institutions (HSI) Fellowships:** Provide HSI with additional opportunities to enter careers in transportation. The fellowships also serve as a feeder for other Eisenhower fellowships.
- **Eisenhower Historically Black Colleges and Universities (HBCU) Fellowships:** Provide HBCU students with additional opportunities to enter careers in transportation. The fellowships also serve as a feeder for other Eisenhower fellowships.
- **Eisenhower Postdoctorate Fellowships (omitted after 1993):** These fellowships enable the GRF students to continue their research in one of the facilities of the U.S. Department of Transportation following the award of the doctoral degree.
- **Eisenhower Tribal Colleges Fellowships (TCF):** Identify transportation related activities and provide student and faculty fellowship opportunities at Tribal Colleges. They also serve as a feeder for other Eisenhower fellowships.

The Program is managed by the Federal Highway Administration's (FHWA) National Highway Institute (NHI) and is funded at a minimum of \$2 million per year. The funds are expected to serve over 100 fellows annually. During the first year of implementation, fellowships were awarded in the following categories:

- 1 Faculty Fellowship
- 25 Graduate Fellowships
- 46 Graduate for Research Fellowships
- 2 Hispanic Serving Institution Fellowships

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- 50 Historically Black Colleges and Universities Fellowships
- 3 Postdoctorate Fellowships

Additionally, since 1993, over 17 HBCUs have participated in administering the program at their respective institutions to approximately 183 student participants whose interest in transportation have been broadened. Without a doubt, the benefits of the program increases the overall applicant pool for the transportation community as well as the number of minority students pursuing undergraduate and graduate degrees in transportation related fields.

NORTH CAROLINA AGRICULTURE AND TECHNICAL STATE UNIVERSITY'S DWIGHT DAVID EISENHOWER TRANSPORTATION FELLOWSHIP PROGRAM

The North Carolina Agriculture and Technical State University (NCA&TSU), a HBCU was designated to establish a Dwight David Eisenhower Transportation Fellowship Program in 1993. Funding for the establishment of the program was provided by the FHWA's NHI. The main thrust of the program encouraged students in their junior year through the doctorate level to pursue careers in fields related to transportation. Detailed insight into the administrative guidelines governing the program is presented next [5].

Purpose of the Program

- To provide assistance in identifying and encouraging minority students to enter careers in transportation.
- To serve as a feeder to the Eisenhower Graduate and Grants for Research Fellowships Programs.
- To stimulate interests of minority students in conducting transportation related research and pursuing careers at the U.S. Department of Transportation and in the transportation industry.

Eligibility Requirements

The fellowships are open to applicants enrolled at NCA&TSU who are U.S. citizens or who are in the process of becoming U.S. citizens. Undergraduate students applying for awards must be in their junior year of college to receive funding.

The fellowships are intended for:

- Students enrolled in a full time degree program with a field of study directly related to transportation.
- Juniors who wish to obtain funding toward a research based transportation related degree at NCA&TSU and who plan to enter the transportation profession after completing their higher education.
- Seniors who wish to obtain a research based transportation related graduate degree at NCA&TSU

and who plan to enter the transportation profession after completing their higher education.

- Graduate students (Masters or Ph.D.) who plan to enter the transportation profession after completing their higher education.

Criteria for Evaluation

Fellowships are awarded on the basis of merit. Available evidence of merit will include:

- Academic records, including class standing, grade point average (GPA), and official transcripts.
- Recommendations regarding the applicant's qualifications.
- Work experience, if any, including employers' endorsements.

Condition of Acceptance

Recipients may not accept another fellowship, scholarship, or similar award and during the period of the award, the recipient must develop a transportation related project that's submitted through the Campus Representative to the Director of the Universities & Grants Program which is under the auspice of the FHWA's NHI.

Tenure

The specific tenure and length of the Fellowship is as follows:

- The tenure will be 9 to 12 months for each fellowship year.
- Fellowship recipients are eligible for funding only during the months of full time enrollment in undergraduate or graduate degree programs with an emphasis related to transportation.
- During tenure of the award, the recipient must maintain satisfactory academic performance as established by the college or university.

Project Requirements

- Undergraduate and graduate recipients must develop a research project on a topic directly related to a relevant transportation problem or issue.
- The Fellow's research project is managed by a Faculty member that is conducting research through NCA&TSU's Transportation Institute and is part of the Institute's Undergraduate/Graduate Mentoring Program.
- Upon completion of the research, a copy of the research results must be submitted to the Director of the Universities & Grants Program. The Director organizes a review panel composed of prominent Transportation professionals to review the research projects and select those eligible for presentation during the Transportation Research Board (TRB) annual Dwight David Eisenhower Transportation Fellowship Program Research Showcase session.

- The results of all research becomes the property of the FHWA and is made available to the FHWA on an unlimited royalty free basis.

Restrictions

Restrictions on the use of fellowship funds are as follows:

- Fellows are eligible for funding only during months of enrollment in full time programs leading to a degree that can be used within the transportation industry.
- After an award is made a major change in course of study is discouraged and must be approved by the Campus Representative and the Deans of the respective programs of study.
- All students must begin tenure at the start of the Fall semester. Undergraduate students must complete their tenure by the end of the Spring semester. Graduate students must apply for renewal of their awards annually.

Funding Levels of Fellows

Stipends are determined by the Campus Representative and is based on local cost of living figures. Tuition, fees, and a one time expenditure (up to \$1,000) for travel to Washington, D.C. to attend the annual TRB meeting held in January are covered by the Program. Stipends per month for the various award levels are as follows:

- Senior level up to \$1,200
- Masters level up to \$1,400
- Ph.D. level up to \$1,600

Evaluation and Selection of Fellows

The applicant is evaluated by the NCA&TSU Eisenhower Transportation Fellowship Review Panel. This panel is composed of prominent Transportation professionals employed at the Federal, State, and Local levels and convenes during the month of February to carefully review the qualifications of each applicant. The evaluation and selection process is comprised of three steps. The first step involves reviewing and scoring the applicant’s application material based on a set of criteria established by the NHI’s Universities & Grants Program Office. The second step involves conducting a 20 to 30 minute interview with each applicant to not only assess their interviewing and oral skills but also their ability to engage in a thought provoking discussion with prominent transportation professionals on relevant issues confronting the transportation industry. A set of criteria established by the Campus Representative is used to evaluate the applicant. The third and final step, requires the panel to consolidate the scores from steps 1 and 2, discuss the results, and submit a recommendation for selection ranked in merit order to the Director of the Universities & Grants Program via the Campus Representative.

CULTIVATING THE NEW TRANSPORTATION PROFESSIONALS

During the past decade, reports by the National Science Foundation, National Academy of Science, National Commission on Public Works Improvement and the President’s Manpower Commission identified transportation as a critical manpower area and minorities are significantly underrepresented. This has been partly attributed to inadequate preparation in mathematics and science and a lack of knowledge about the career opportunities in this field [2].

To close the gap, NCA&TSU have been successful in tapping a rich community of talented minority students and have provided them with a rewarding opportunity to enter careers in transportation. As shown in Table I, over the past 10 years, 31 students (an average of 3 awards made per year) have been awarded Eisenhower Fellowships. Among the awardees, 6% were graduate master level students and 94% were undergraduate students.

TABLE I
NCA&TSU HBCU DWIGHT DAVID EISENHOWER RECIPIENTS

Academic Year s	Transportation Related Fields of Study	Number of Awardees (Number Working in Transportation Industry)
1993-1994	Civil Engineering, Marketing, Transportation Logistics	9 (2)
1994-1995	Civil Engineering and Transportation Logistics	3 (1)
1995-1996	Civil Engineering and Transportation Logistics	3 (2)
1996-1997	Civil Engineering and Transportation Logistics	2 (2)
1997-1998	Civil Engineering and Transportation Logistics	4 (2)
1998-1999	Transportation Logistics	1 (1)
1999-2000	Transportation Logistics	1 (1)
2000-2001	Civil Engineering and Transportation Logistics	2 (2)
2001-2002	Civil Engineering and Transportation Logistics	3 (3)
2002-2003	Civil Engineering and Transportation Logistics	3 (*)
Total		31 (16)

(*) INDICATES AWARDEES HAVE NOT GRADUATED

Moreover, the transportation related fields of study on NCA&TSU’s campus impacted the most by the fellowship program are Civil & Environmental Engineering (45%), Marketing (10%), and Transportation Logistics (45%). With dedicated undergraduate and graduate programs in

Transportation Engineering (College of Engineering) and Transportation Logistics (School of Business and Economics), the Eisenhower Fellows are educated on transportation fundamentals and cutting edge issues related to [3]:

- Economic policy
- Human factors
- Information networks
- Institutional issues
- Modern communication systems and telecommunication policies
- Systems methodologies
- Technology advances
- The social, political, institutional framework in which transportation operates

Gaining Access to Research Based Opportunities

Regarding access to research based opportunities, NCA&TSU is fortunate to have a Transportation Institute that has been in existence for over 30 years. The focus of the Institute is to facilitate multidisciplinary and interdisciplinary research pertaining to transit issues within an urban and rural environment. Over 90% of the research projects are spearheaded by university professors in the College of Arts and Science, College of Engineering, School of Business and Economics, School of Education, and the School of Nursing.

Once the Eisenhower Fellows have been selected, they are encouraged to identify a research topic that aligns itself with one of the ongoing research projects funded by the Transportation Institute. In doing so, they are assigned as an Undergraduate or Graduate Researcher to the project and the Principal Investigator mentors them as well as guides them through the research process. At the conclusion of the Fellows tenure, he/she must complete and submit a final research report pertaining to their research efforts to both the Principal Investigator and the Campus Representative. Once the final report is reviewed, it is then submitted to the Director of the Universities & Grants Program. There, it is reviewed and considered for presentation at the TRB annual Dwight David Eisenhower Transportation Fellowship Program Research Showcase session.

During the 2001-2002 academic school year, all three of the Fellows served as Undergraduate Researchers on the same research project. The project focused on modeling hurricane evacuation of small urban and rural areas. Their final report was accepted for presentation at the 2002 TRB annual meeting. Funding to attend a professional development activity such as TRB is provided by the Program. Also, each received awards and recognition from the Civil & Environmental Engineering Department and the Transportation Institute's Advisory Board and are employed with three different transportation agencies located in the states of Maryland, Missouri, and North Carolina.

Employment with Transportation Related Industries

International Conference on Engineering Education

Finally, transportation depends on a broad cadre of people with specific knowledge and skills. It is a profession that requires dedicated specialists with keen technical and managerial backgrounds. Persons with this type of training and experience are in constant demand [2].

Transportation experts are also a critical factor in assuring a favorable quality of life and the future development of American industries. Virtually every major business sector depends on well trained and educated transportation professionals [2].

In reviewing Table I, approximately 52% of the Eisenhower Fellows are currently employed with transportation related industries across the U.S. Of the remaining 48%, 35% of these students are continuing to pursue degrees in transportation education.

Without a doubt, the NCA&TSU's HBCU Eisenhower Fellowship Program is playing a key role in exposing minority students to the transportation community. Additionally, it is serving as a pivotal point in preparing minorities for advanced degrees in the field as well as simulating their interest in basic and applied transportation research.

CONCLUSION

The community of minority students enrolled in the nation's HBCUs constitute an untapped resource that should be supported as they prepare to enter transportation related careers. The Dwight David Eisenhower HBCU Fellow Program is an ideal model that has been successful in reaching this community. During the 21st century, it is encumbered upon us to continue the implementation of models such as this one, if we are to forge excellent transportation education pipeline partnerships that will be successful in meeting the demands of the transportation profession.

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