10.9 COOPERATIVE EDUCATION EFFORTS IN SURFACE TRANSPORTATION WEATHER

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1. INTRODUCTION

The emergence of new technologies to support the expanding national surface transportation programs of 511 and Maintenance Decision Support Systems (MDSS) is requiring specialization in the meteorology workplace that supports these specific efforts. With the expanded use of grid forecasting systems, ensemble modeling, pavement condition forecasting and the increased availability of remotely sensed data, more is being asked of operational meteorologists to craft the location-based forecasts required of 511 and MDSS.

2. BACKGROUND AND MOTIVATION

Cooperative education, introduced first in 1906 by Dr. Herman Schneider, Dean of the University of Cincinnati Engineering School, has flourished primarily within the engineering disciplines. By their nature, cooperative education programs require a significant level of commitment by the academic institution, the sponsoring employer and the cooperative education student. Often the cooperative education sessions will begin while students are lower division students and continue until graduation. Some programs extend the cooperative education effort to the graduate level.

The development of a successful cooperative education program requires a commitment from both the academic institution and the sponsoring employer. In most instances, a specialized cooperative education offering is established between the academic institution and the sponsoring employer that meets the specific needs of the employer.

Unfortunately, cooperative education programs in the atmospheric sciences are not readily available to most students. Programs exist with many of the National Weather Service Forecast Offices for volunteer cooperative education programs. In the private sector opportunities are more limited and frequently exist only during the summer months and are often not well coordinated with university academic programs.

The development of a cooperative education program specific to surface transportation comes as a result of the interaction of University of North Dakota (UND) faculty with the surface transportation industry and the awareness of a lack of university trained atmospheric scientists specific to the surface transportation weather discipline.

Over the past two decades the maintenance divisions of state departments of transportation (DOTs) have increasingly utilized surface weather monitoring along the roadway through deploying their own road and weather information systems (RWIS). To better utilize this information, the DOTs have expanded the use of private sector weather forecast services to better define weather conditions during maintenance activities and in support of increase public safety programs i.e., 511 and MDSS. While the basis of this weather support involves traditional weather forecasting activities, specialized forecasts such as pavement condition forecasts go well beyond the traditional forecast paradigm.

As computer and weather forecasting technologies have improved in the past decade, the demand and expectation from DOTs for better location-based weather forecasts has resulted. The use of these advanced analysis and forecasting tools in the private sector requires either an in-house employee-training program or the presence of a pool of meteorologists cognizant of the special demands found within surface transportation meteorology.

To respond to this requirement and to anticipate the increased demand for well-prepared operational meteorologists in the surface transportation industry, the UND department of atmospheric sciences

implemented the nation's first focused curriculum in surface transportation weather in 2001 (Osborne, 2001). Building upon this program to increase the experiential learning of the UND students, a cooperative education program has subsequently been developed between UND and Meridian Environmental Technology, Inc. (Meridian). The goal of this program is to foster enhanced educational experiences by promoting stronger awareness of issues and emerging technologies in this growing sub-discipline in the atmospheric sciences.

3. PROGRAM DEVELOPMENT

The University of North Dakota has embraced cooperative education efforts since 1968 when an engineering cooperative education program was established on campus. Since that time, cooperative education has been established across most professional degree programs including the UND department of atmospheric sciences. With a strategic goal of providing every student on the UND campus with an experiential learning opportunity (UND, 2000), cooperative education is emphasized in every academic department.

In establishing a cooperative education program in surface transportation weather, it was necessary to develop program requirements that met not only the UND cooperative education program requirements and provided a beneficial experiential learning opportunity for the student, but also provided the incentives to the private sector to encourage them to make the financial commitment to such a program. Using these as the fundamental design criteria, UND and Meridian developed program requirements intended to foster student willingness to participate in the program. Selection of cooperative education students was made by Meridian from a pool of candidate students forwarded to Meridian by UND.

3.1 University of North Dakota

Cooperative education at the University of North Dakota is an academic program providing students with opportunities to both integrate and combine their course learning with practical, professional work experience in their chosen field of study. Through the cooperative education program, students secure salaried, career-related work experiences under the supervision of both a sponsoring employer and the appropriate academic department, while at the same time receiving academic credit. The premise of the program is the belief that learning extends beyond the classroom and that the combination of course learning and practical work experience provides an innovative and comprehensive education.

The UND surface transportation weather cooperative education program is a two-year program eligible to majors in atmospheric sciences. Although the program is intended to begin during a student's junior year and span two years, senior students are permitted to participate for one year, subject to available positions. The minimum requirements to enter the program are the successful completion an upper-division undergraduate course in thermodynamics and to have completed or be enrolled in dynamic meteorology. The cooperative education session typically begins during the winter semester of the student's junior year and may extend continuously until the end of the student's senior year. Except during the summer semester when the cooperative education students work full-time, students can continue with academic coursework during the cooperative education sessions, albeit at a reduced level determined through consultation with their faculty advisor. During the fall and winter semesters, cooperative education students are expected to work a minimum of half time with the sponsoring employer.

During their senior year, cooperative education students are expected to enroll in UND's surface transportation weather courses. It is during this year that university coursework tailored to their cooperative education assignment results in the maximum blending of classroom and practical experience.

A student's continuation in the cooperative education program is determined by student desire to continue, approval from UND department of atmospheric sciences and the cooperative education program, and by recommendation from Meridian. UND and Meridian decisions are based upon meeting acceptable academic and work performance measures.

3.2 Private Sector

In 1998 Meridian Environmental Technology, Inc., a national provider of weather services, approached the University of North Dakota in regards to developing enhanced student learning through operational experiences in the physical sciences. Specific interests were in atmospheric science, geographical information systems (GIS) and remote sensing applications.

As UND began developing its area of concentration in surface transportation weather, it was suggested that a cooperative education program specific to surface transportation weather be developed.

As part of the cooperative education program, Meridian agrees to provide application specific training to cooperative education students beyond that received at UND, a compensated position (at least half-time during the academic year and full-time during the summer), and operational analysis and forecasting experience.

Criteria for selection of the students includes a review of the student's academic record, a personnel interview with Meridian's forecast manager and Meridian's human resource director, approval of the UND Cooperative Education Program and the recommendation of the UND atmospheric sciences faculty. While the review of the student's academic record considers accumulative and major grade point average, special consideration is made in the interview to evaluate the student's ability to think creatively and to communicate effectively. For this reason the strength of the student's liberal arts education is considered vital to the success of the student in the cooperative education program.

3.3 Coordination

The coordination of the student cooperative education efforts is a shared responsibility between the student, the university and the sponsoring employer. The task is made convenient through a sophisticated web-based reporting and monitoring system developed by the UND Cooperative Education Program Office (http://www.career.und.edu). Each semester all cooperative education students are required to complete a student job objective form, a student mid-term form, a student final job objective form and a student exit evaluation form. The initial student job objective form is completed in coordination with the student's supervisor from Meridian and approved by the UND Cooperative Education Officer and the UND atmospheric sciences cooperative education coordinator.

Besides coordinating the student's job objectives for each semester, Meridian completes a mid-term and final employer evaluation form. These forms, along with the student's forms, are the basis for evaluating the success of the cooperative education experience.

4. RESULTS

The initial cooperative education session was offered during the 2002 UND winter semester. Three UND atmospheric sciences majors were selected to participate from a field of eight applicants. Each student selected had met the UND selection criteria. The students were provided with an initial three-week intensive training program at Meridian's forecaster training facility. This training included review of critical synoptic and meso-synoptic analysis and forecasting procedures and an introduction in the methods of surface transportation weather forecasting. As the students demonstrated sufficient skill in analysis and forecasting, they were subsequently scheduled into a work schedule that permitted them to gain operational forecast shift awareness. The training efforts continued at a modest pace with an emphasis placed on the understanding of operational weather forecasting methodologies, the Meridian analysis and decision criteria used to make specific surface transportation weather forecasts and training on the use of Meridian's graphical forecast editor and interface.

During the first semester the student's focused most of their effort on training and becoming acquainted with the operational forecasting environment. By the end of the first semester the student's were participating in quality control monitoring activities and updating of weather elements within the Meridian en-route traveler weather information system.

The second semester was a summer semester that resulted in a shift to convective storms forecasting and a gradual increase in the level of forecast shift participation. The student's were placed in an operational forecaster shift rotation and continued daily interaction with Meridian staff meteorologists. As a student's progress permitted, the student was given additional forecast support responsibilities; however, a lead forecaster always monitored the student's work.

Two of the three initial cooperative education students received invitations from Meridian to continue their cooperative education session into the second year. At the time of this paper, these two students were actively working operational forecasting shifts in the surface transportation weather services. Their responsibilities have expanded beyond forecast support to a limited active forecasting role under the continued guidance of a lead forecaster.

The success of the students to date has clearly indicated the ability of the cooperative

education program to develop the necessary skills needed to support rapid entry of UND graduates into the surface transportation weather forecasting profession.

5. FUTURE DIRECTIONS

The early success of the surface transportation weather cooperative education program between UND and Meridian has resulted in a decision to continue the program into the foreseeable future. It is anticipated that growth in the program student participation could be as high as five hundred percent in the coming two years.

The University of North Dakota is presently exploring ways to expand the surface transportation weather cooperative education program with additional sponsoring firms. Further, Meridian and UND have begun discussions as to how the present cooperative education partnership can be expanded into a formal Meridian preferred hiring program.

6. SUMMARY

A cooperative education program emphasizing surface transportation weather has been developed at the University of North Dakota through a partnership with Meridian Environmental Technology, Inc. The early success of the program indicates that it is a benefit not only to the students who participate in the program, but to the academic and sponsoring employer as well. The University will use the program to provide experiential learning opportunities and for student recruitment. Meridian will use the program to pre-qualify and train potential new employees.

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8. REFERENCES

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