

Graduate Student Research matters

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More teachers for



THE NATIONWIDE SHORTAGE of science and math teachers can be felt right here in Missouri, especially in rural areas.

In 2007 the Missouri Department of Education annual school survey reported shortages of teachers in more



As a doctoral candidate in Curriculum and Instruction, Patrick Brown is analyzing the viability of an alternative certification program for Missouri science teachers.

than 15 disciplines. Science has been on that list for at least 10 years.

"It's difficult to find people who want to teach in small rural schools," says MU graduate student Patrick Brown. "And a two-and-a-half year commitment to obtain certification through many traditional teacher preparation programs often turns potential teachers away."

Brown, who taught high school science for two years in Mexico, Missouri, is now a doctoral candidate in Curriculum and Instruction, with an emphasis in Science Education. He is analyzing how beginning teachers develop knowledge for teaching in an alternative certification program designed to expedite the certification process. Alternative certification programs are one of many tools developed to help address the teacher shortage.

Brown's research suggests that well-designed alternative certification programs can prepare science teachers as effectively as traditional methods. But not all alternative programs are equal, he says.

"Some programs assume that if you have a degree in science, you know how to teach," he says. "And we know that's not true."

A good alternative certification program, according to Brown, contains two main components: several science-specific teaching methods courses and good mentors in the K-12 schools.

The alternative certification program at Mizzou, which Brown studies, offers two tracks: The first takes 15

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- ✓ Highway design & safety
- ✓ Wildlife conservation



A Driving Force

behind MO highway design

MISSOURI DRIVERS are often intimidated or angered when large trucks roar past them on the freeway. In turn, drivers expect the Missouri Department of Transportation to make policies that enable the safest travel for both cars and trucks.

In order to make meaningful policy changes, MO DOT needs hard data regarding crashes and driving behaviors, and they recently turned to Mizzou graduate student Derek Vap to provide that research. Vap, MS Civil Engineering '07, was eager to put the skills he's learned in school to use for the state.

"The transportation network is vital to our economy, and if it is not safe, and if we can't figure out how to make it safer, then we'll never make it truly efficient for all its users," he says.

Vap observed the traffic patterns of large trucks and developed a new method of calculating the amount of accidents each type of vehicle causes relative to the number of cars and trucks on the road.

Using a portable overhead surveillance method developed by his adviser, Carlos Sun, Vap analyzed speed



differentials by large trucks on I-70 and I-435 in Kansas City, I-70 and I-270 in St. Louis, and I-70 and I-44 in rural Missouri. He determined that on average, trucks travel at lower speeds than cars, especially on rural highways, where the average is a significant 3.5 fewer miles per hour. This, of course, can cause increased passing and weaving by other drivers.

Vap also assessed lane-usage by trucks and determined that trucks generally drive in the middle lanes, which is typically the safest option.

Finally, using MO DOT accident data from 2002-2006, Vap was able to calculate crash rates for accidents involving at least one car and at least one truck, based on the number of cars and trucks on the roadway. This, then, reflects the relative safety of cars and trucks.

He provided MO DOT with data concluding that trucks are more likely to be at-fault in accidents on urban freeways, whereas cars are more often at-fault in fatal and disabling-injury crashes on rural highways. In minor-injury crashes on both urban and rural interstates, Vap determined that trucks are more likely to be at-fault.

Using Vap's numbers, MO DOT will be able to more effectively make policy decisions regarding Missouri's freeways. Such decisions include whether to implement a lower speed limit for large trucks or to



Graduate student Derek Vap notes the lane usage and driving habits of large trucks on Missouri's highways using data collected from a portable overhead surveillance camera. He provided his research results to MO DOT to be considered when making infrastructure and policy decisions.

set truck lane restrictions, or even to build exclusive truck lanes.

After graduating in December 2007, Vap headed off to Kansas City to continue working on highway design, planning and operation.

"Personally, I think it is very fulfilling because transportation is involved in everyone's life and in nearly every aspect of our lives," he says.

Research conducted by University of Missouri graduate students directly benefits Missouri's schools, infrastructure and economy. Whether in the sciences, engineering, social sciences or humanities, the work of these students contributes to the knowledge base that informs our state's departments and decision makers.

From exploring ways to efficiently prepare Missouri's science teachers to collecting the data necessary to effectively design our state's highways, Mizzou graduate students carry out original research that ultimately benefits citizens across the state.

With more than 5,000 graduate students enrolled in 95 programs, graduate students make up nearly 20 percent of the University of Missouri student population. Graduate students participate in work that enhances the prestige of the University and the state.

Inspiring city kids to value the outdoors



Although Brandon Pope grew up in Chicago, he developed a love for nature as a child. Now, as a graduate student at MU, he seeks to instill that passion in others who are growing up in cities.

Degree Program: MS, Fisheries and Wildlife

Research Focus: Pope's research investigates how inner-city children relate to nature. He will conduct a study in Kansas City, MO, to assess the perceptions middle school students have about wildlife before and after their participation in a 4-H Wildlife Habitat Evaluation Program.

Ultimate Goal: To foster enthusiasm in inner-city children about wildlife, which could potentially lead to "a diverse group of future natural resource managers."

Academic Recognition: Pope was selected as a 2008 fellow for Park Break!, a national program designed to immerse selected graduate students in critical issues regarding conservation, policy and science. Pope spent a week working at Indiana Dunes National Lakeshore Park.

In his own Words: "The involvement of people from all parts of the state can bring different viewpoints to the discussion table, so as to find the best solution to the ecological problems in Missouri and beyond its borders. To involve children is to ensure that the future stewards of the land are environmentally conscious and will make decisions that do not have a deleterious effect on the environment."

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months to complete, and the second, designed for those who would like to teach full-time throughout the program, takes two years. A traditional certification process, on the other hand, can take two to three years and does not allow students to teach full-time while earning the certificate.

Students who take part in the alternative program come from a variety of backgrounds. Many have recently earned undergraduate degrees, some have a graduate education, and some have decided to make a career change.

Both alternative tracks at MU require extensive course work, with a focus on science teaching and learning. In the program students learn strategies for making instruction more student-centered, ways to maximize the effects of hands-on, inquiry-based instruction, as well as effective approaches to curriculum planning and assessment.

"It's hard to learn how to teach," Brown says. "Alternative certification students have a lot of the same struggles as people who go through traditional programs." These struggles include learning to manage a classroom and to translate knowledge and science experience into a format students can understand, he says.

But Brown's research suggests that with immersion in the classroom (20 hours a week for the shorter track,

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and full-time work for the two-year track), along with the guidance of experienced mentors who share the educational philosophy of the program, new teachers in the alternative program quickly learn how to design effective instruction. He speculates this could be a result of the extensive time these beginning teachers spend in the classroom.

Missouri has already taken steps to address the teacher shortage, most notably by enacting loan forgiveness programs. Getting the most out of alternative certification is one more step toward meeting the state's educational needs.

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22,000 Mizzou graduate alumni in Missouri

95 Graduate degree programs at MU

1,348 Average number of MU graduate degrees awarded each year