Railway Engineering Education Symposium

Evolving to Rebuild a Growing Rail Academic Community

Pasi Lautala and C. Tyler Dick

Although freight traffic declined in 2016, North American railways have experienced a decades-long period of growth in freight ton-miles and in the number of commuter and intercity passenger rail trips. This growth, combined with the aging railway workforce, has triggered renewed demand for university graduates to enter railway careers. However, after decades of neglect, only a few North American academic programs are engaged in rail-related research and education. The railway academic community must be rebuilt to meet the industry workforce needs of the future. Since 2008, the Railway Engineering Education Symposium (REES) has been staged as a biannual collaboration between academia and industry to expose professors to railway engineering education topics. REES has prompted faculty at numerous universities to expand railway content in introductory transportation courses and to establish new courses on railway engineering topics. According to feedback from surveys of attendees, REES has evolved to support the growing railway academic community better. Expanding its original focus on new professors, REES now serves as a user conference for returning professors already engaged in railway education activities and is accompanied by online delivery of previous materials. This paper briefly reviews the decline of the relationship between railways and academia, then concentrates on the role of REES in its reemergence. Evidence of REES successes from participant surveys is documented, and challenges on the path forward are discussed.

The North American railway network provides safe, reliable, and efficient movement of people and products that drives economic development. Because of growing population, changing travel patterns, shifting commodity flows, aging infrastructure, climate change, and availability of dedicated funds for transportation, railways must continually adapt through research and innovation. A well-functioning rail transportation system depends on a supply of skilled rail transportation leaders who will plan, design, operate, maintain, and manage the rail system of the future. However, only a few academic programs in North America are engaged in rail-related research and offer courses to educate the next generation of railway professionals (*1*). This paper briefly describes how the rail industry arrived at this point and concentrates on one successful effort undertaken in the past decade to rebuild and grow the railway academic community.

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DECLINE OF RAILWAY EDUCATION IN ACADEMIA

The historical relationship between North American railroads and higher education reached a high point in the early 20th century (*2*). At that time, railroad engineering and economics made up significant portions of university curricula in civil, mechanical, and electrical engineering. The need for trained engineering professionals to expand the North American rail network had been a major force in the development of these disciplines within universities.

By the early 1950s, when air and highway transportation rapidly surpassed railways as preferred passenger transportation modes in the United States, the university–railway relationship began to weaken. As passenger rail service was discontinued on many lines, fewer students used railway transportation or were exposed to active rail construction projects (*3*). Whereas railways were viewed as a mature technology with a shrinking network, the rapid expansion of highway and airport infrastructure presented research challenges that, coupled with liberal funding to address them, quickly drew the interest of transportation academics. Universities eliminated railway engineering programs, faculty adjusted their university transportation courses, and students altered their career plans accordingly. Between 1956 and 1964, only 0.3% of graduates of the civil engineering program at the University of Illinois at Urbana–Champaign went on to employment in the rail industry, a substantial decline from the rate of more than 10% between 1910 and 1920 (*4*).

The relationship between universities and railways continued to decline during the 1960s and 1970s as railways consolidated, abandoned thousands of miles of track, deferred maintenance, and curtailed investment in research and development. Deregulated in 1980, railways cut costs by reducing employment and outsourcing many engineering functions to consultants. By the 1990s, most engineering graduates obtained their degrees without any exposure to railroads. By the start of the 21st century, railway engineering was included as a topic in general transportation courses at less than 15% of North American universities and was offered as a separate course at approximately 3% (*5*). In 2005, a survey of 500 engineers with 5 years or less of rail industry experience revealed that 84% had not received any college exposure to rail topics (*5*).

REJUVENATION OF RAIL INDUSTRY AND DEMAND FOR GRADUATES

As early as 1980, it was recognized that the level of railway engineering course content would not sustain long-term demand for railway engineering professionals (*6*). However, it would take several decades, a dramatic increase in traffic, constrained capacity, changing demographics, and renewed interest in passenger rail for the issue to come to the fore.

As university railway educational activities dropped to their lowest point, North American freight railroads were in a period of growth and expansion, record traffic levels being driven by containerized freight and high demand for bulk commodities such as coal. Between 1980 and 2008, Class I railroad revenue ton-miles would nearly double, and the railroad share of all freight ton-miles would increase significantly to 42% (*7*). Higher axle loads that increase productivity and constrained capacity on key main-line corridors led railroads to invest hundreds of billions of dollars in capital improvement projects (*8*). Studies of future traffic growth indicated that more than $100 billion in further improvements are required to meet demand through 2035 (*9*).

In the same period, there was renewed interest in expansion of passenger rail service. Between 2002 and 2013, as various states developed regional intercity passenger corridors, Amtrak ridership increased by more than 50%, and Amtrak set a new annual ridership record in 10 of 11 years (*10*). Between 1997 and 2012, commuter rail ridership increased by 49%, and eight new commuter rail systems have inaugurated service since 2004 (*11*). Planning and design of proposed high-speed rail systems has slowly created additional demand for railway engineering talent while simultaneously capturing the imagination of many students (*12*).

The railway capacity projects needed to support growing freight and passenger traffic created a sudden increase in demand for railway engineering professionals that academia was not equipped to meet (*13*). For the rail industry, the general demographic trend of an aging transportation workforce was compounded by the decades-long lack of railway engineering course content at the university level (*14*). As the senior project managers who have railroad engineering in their academic programs retire, the railroad industry faces the prospect that rail design will be inherited by a young generation of designers who have little, if any, academic background and domain knowledge of railroads (*15*). Reversing this trend would require reintroduction of railway concepts into transportation engineering curricula and rebuilding the relationship between the railway industry and academia.

NECESSARY PARTNERSHIP

Academicians—engineering professors in particular—play an integral role in meeting the demand for railway transportation professionals by guiding students on the university path to the rail industry (Figure 1). Although railways still fascinate many young people, and youth continue to be involved in model railroading and other railway enthusiast hobbies, only a small minority of students seek specific academic programs in railway engineering because of their personal interests. With little railway industry outreach to youth at the K–12 level, most engineering students enter university with no awareness of potential careers in the rail industry. The rail industry relies on faculty engaged in railway education and research to act as ambassadors and promote student awareness of the railway field. Faculty may be aided in on-campus outreach to incoming freshmen by student groups, such as student chapters of the American Railway Engineering and Maintenance-of-Way Association (AREMA).

Students most often receive their first formal exposure to railway concepts through lectures in introductory transportation engineering courses. These lectures are key to sparking student interest in the field and leading students to enroll in senior-level elective courses on railway topics, where available. Relationships between faculty and railway practitioners are essential for arranging experiential learning for students through industry internships or involvement in railway research at the undergraduate or graduate level. Railway industry support of student involvement in rail research conducted by faculty provides advantages in three ways: (*a*) new solutions to problems facing the industry through research results, (*b*) well-trained university graduates prepared to implement these solutions as they embark on careers as railway transportation professionals, and (*c*) new academic faculty with demonstrated capabilities and interest in continuing rail-related research.

To increase the pool of potential students for industry careers, faculty and AREMA student chapters have engaged in outreach to K–12 students, typically through railway-themed science, technology, engineering, and mathematics (STEM) activities. Examples include the Summer Youth Program in Rail and Intermodal Transportation at Michigan Technological University, the engineering open house and summer STEM camp rail day at the University of Illinois at Urbana–Champaign, and support of the Boy Scouts railroading merit badge at various campuses.

Although this university pathway to the rail industry works well, it is truly functioning at only a few campuses across North America. Further academic involvement is needed, but there are various barriers to overcome.

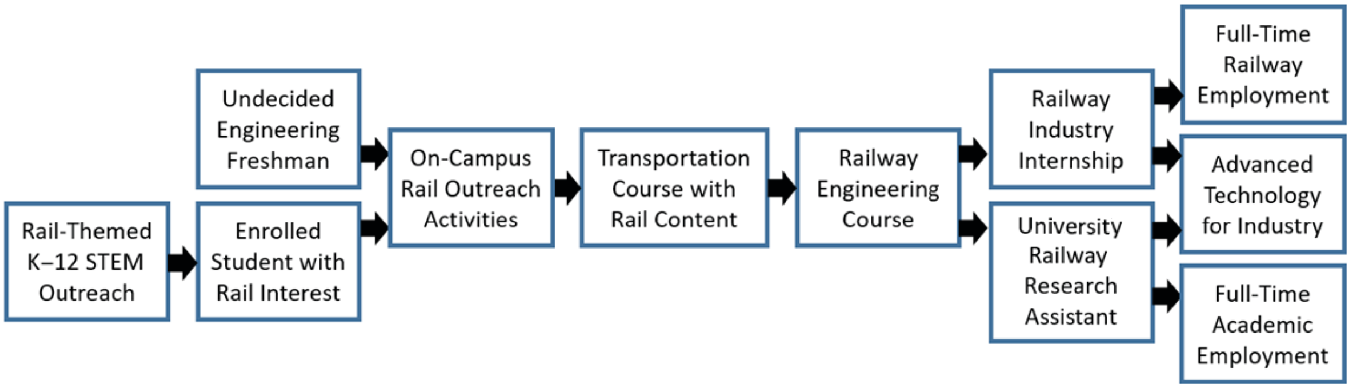

FIGURE 1 University pathway to rail industry.

CHALLENGES TO INCREASED ACADEMIC INVOLVEMENT

The resurgence of railway transportation, in particular the purchase of BNSF Railway by Berkshire Hathaway and the introduction of the Obama administration's Vision for High-Speed Rail, both in 2009, did not go unnoticed by academia. A survey of civil and transportation engineering professors by the AREMA education and training committee (the so-called Committee 24) found interest in incorporating railroad engineering material into current transportation courses and development of new courses devoted to the subject (*16*). However, the survey also identified the following barriers to expanding railway education:

- Lack of research funding to attract young faculty to pursue rail-related topics;
- Lack of teaching materials that focus on railway concepts because railroad courses have been discontinued for many years; and
- Lack of connections between faculty and railway engineering professionals, particularly a lack of alumni because of elimination of railroad courses and programs.

In competition for academic attention, these barriers make railways less attractive than other transportation modes for which federal and state funding is more readily available, teaching materials have been maintained, and professors have direct connections to decades of transportation alumni. Even in Europe, which is perceived to have a stronger railway academic community than North America, varying faculty interest in rail has resulted in gaps in university railway curricula (*17*). A strong push from industry is needed to overcome these obstacles in North America (*16*). Thus, an innovative industry-sponsored event to provide interested faculty with railway engineering course materials and connections to industry professionals was developed. The Railway Engineering Education Symposium (REES) is central to rail industry efforts to rebuild the railway academic community.

RAILWAY ENGINEERING EDUCATION SYMPOSIUM

REES brings together engineering professors, their peers who are already specializing in railway engineering, and railway engineering professionals who work for railroads, governments, consultants, and research facilities. The symposium provides professors with lecture materials for incorporation into transportation classes. Through presentations and discussions, they learn basic railroad engineering concepts so they can use the lecture materials effectively. REES also exposes professors to various facets of the railway industry, including its recruitment and research needs.

REES has its origins in a 2007 white paper developed by AREMA Committee 24 that outlined the basic framework for the event:

- A 3-day workshop for professors, including classroom lectures and field visits;
- Lecture materials designed for incorporation into a civil engineering curriculum, provided by industry and experienced railway academics;
- Modular lecture materials professors can mix and match to create self-contained material that fits interests and available lecture slots in their transportation courses;
- Ten to 20 invited professors who have had little exposure to rail concepts;
- Stipends to cover travel expenses of invited professors;
- A $20,000 funding goal from major railroads, FRA, the Association of American Railroads, and major railway engineering consultants; and
- Event coordination by AREMA Committee 24.

The concept of the railway industry developing lecture content on railway topics for distribution to universities through AREMA Committee 24 dates to the late 1950s (*3*). However, early efforts lacked the first-person interaction and networking elements that would become a key to the success of REES.

The first REES event, held in 2008, was considered highly successful. REES events have been held every 2 years since, the most recent in July 2016. While still fulfilling its original mission of exposing professors who are new to the rail field to railway concepts, REES has evolved into a user conference, at which returning professors involved in railway engineering education can share ideas and seek input from peers on developing their railway education and academic research programs.

The planning and content development aspect of REES has also evolved. The initial REES collaboration was between AREMA Committee 24, industry professionals, and a few professors actively teaching railway engineering courses. As more faculty have become engaged in railway education, the lecture content is now almost exclusively developed by railway academicians. Professors affiliated with the National University Rail Center (NURail), a U.S. Department of Transportation (DOT) university transportation center, have taken on a larger role in organizing the logistics of more recent REES events. Although funds raised through the AREMA educational foundation continue to financially support the attendance of professors new to the rail domain, travel costs for many presenting professors and returning attendees are supported in part by NURail funds from the U.S. DOT.

EVOLUTION OF REES

REES Participation

The REES events of 2008 to 2016 had 113 new and 22 returning professors from 70 universities (Figure 2). REES was developed to introduce railway engineering to professors with no prior exposure. Figure 2 shows that the first two REES events were dominated by professors participating for the first time. However, from 2012 on, the event was modified to include complementary content for professors returning to expand their learning and exposure. Thus, participation in later events shifted toward a balance between new and returning professors.

REES Content and Materials

Although the overall structure and organization of REES has remained stable, the event must evolve to remain relevant as the railway academic community grows and matures. The first two REES events concentrated on the content envisioned in the 2007 AREMA Committee 24 white paper (Figure 3). However, modifications were made for each of the subsequent events. These changes were based on the outcomes of previous REES events but were also affected by feedback obtained in a 2013 comprehensive survey of REES

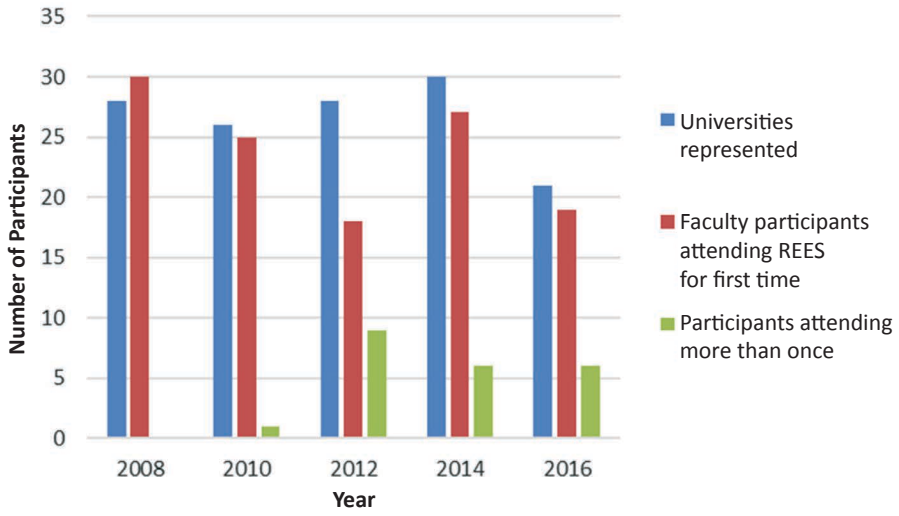

FIGURE 2 REES participation by event, 2008–2016.

participants in 2008 to 2012 that yielded 17 responses (20% of total previous participants).

The basic modules were presented at every REES event until the 2016 event. However, as detailed in Table 1, new modules were developed for the 2012, 2014, and 2016 events to increase either the depth or the breadth of railway topics covered in the lectures. Nearly two-thirds of the 2013 comprehensive survey respondents saw this as the most effective way to improve the next REES event; the responses also highlighted the interest of previous REES participants in returning for more learning and materials.

The 2016 event was a major shift in the development of REES for two reasons. First, REES moved away from the presentation of basic and advanced modules. Videos of 2014 modules and accompanying lecture slides were made available to REES participants, but instead of use of event time for this purpose, they were distributed online (*18*). There is no cost to use the materials, but they are meant for noncommercial use only, and access requires user registration.

Most of the modules developed for the 2016 REES event built on the basic and advanced modules presented at earlier editions of REES, and recordings and slides of these modules will be available through the online system. The remaining modules newly developed for REES 2016 concentrated on providing tutorials and hands-on examples to professors so they can more effectively teach the REES materials in an interactive format.

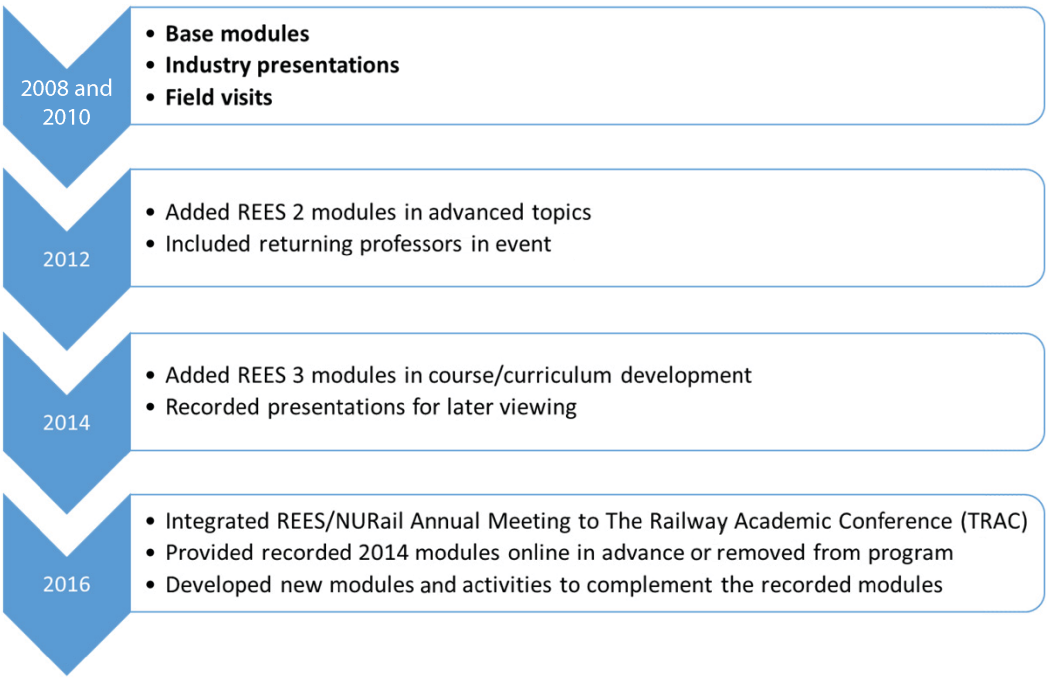

FIGURE 3 Evolution of major REES components, 2008–2016.

TABLE 1 REES Content and Materials, 2008–2016

Characteristic	2008 REES	2010 REES	2012 REES 1	2012 REES 2
Location	University of Illinois at Urbana–Champaign	Johnson County Community College–Overland Park, Kans.	Johnson County Community College	
Course modules	Introduction Railroad Engineering	Introduction Railroad Engineering	Introduction Railroad Engineering	Vehicle Train Dynamics
	Introduction Railroad Infrastructure	Introduction Railroad Infrastructure	Introduction Railroad Infrastructure	Train Performance
	Railroad Power, Acceleration, and Traffic Control	Train Energy, Power, and Traffic Control	Train Energy, Power, and Traffic Control	Advanced Train Control
	Railroad Intermodal Transportation	Railroad Intermodal Transportation	Railroad Intermodal Transportation	Introduction Railroad Capacity
	Transit Commuter Intercity Rail Transportation	Transit Commuter Intercity Rail Transportation	Transit Commuter Intercity Rail Transportation	High-Speed Rail Planning
	Railroad Capacity	Railroad Alignment Design and Geometry	Railroad Alignment Design and Geometry	Railroad Engineering Software
	Railroad Engineering Design Project	Railroad Engineering Design Case Studies	Railroad Engineering Design Case Studies	Shared Corridor Challenges
Keynote and industry speakers	Sergi Pecori, Hanson Professional Services	Robert Boileau, BNSF	William Van Trump, Union Pacific Railroad	
	Amtrak	Kansas City Terminal Railway	BNSF	
	Canadian National	FRA	FRA	
	FRA	AAR/TTCI	AAR	
	AAR/TTCI			
Field trip	Norfolk Southern Decatur Yard, Decatur, Ill.	BNSF Argentine Yard, Kansas City, Kans.	BNSF Argentine Yard	

NOTE: AAR = Association of American Railroads; TTCI = Transportation Technology Center, Inc.
[a]Table includes modules presented during REES portion of the TRAC Conference.
[b]Modules that built on earlier REES.

The second major shift in 2016 was integration of REES and the NURail annual meeting to form The Railway Academic Conference (TRAC). The goals of REES and NURail are closely aligned, and integration with another railway event was seen as the preferred delivery method for future REES events by more than half of the 2013 survey respondents. The REES portion of the event concentrated on providing and discussing new materials and curriculum development, whereas the NURail portion concentrated on discussions related to K–12 outreach, workforce attraction and development, and future needs for research. The formation of TRAC allowed academics coming to the REES event to participate in the NURail discussions, an opportunity often missed because of lack of funding and time to participate in multiple conferences.

REES OUTCOMES

The organization of every REES event requires a significant financial and time commitment from the involved industry practitioners and academicians. Therefore, each 2-year cycle begins with an analysis to determine whether continuation of the program is justified. This justification relies on input from AREMA constituents on the industry demands and the feedback from previous participants to evaluate the outcomes and benefits of the event. In addition to the survey of all previous participants in 2013, a separate survey is conducted after each individual event. Just like REES, the surveys have evolved over time, so only some of the responses are directly comparable across all events. A paper by Lautala et al. provided a more detailed comparison of the 2010 and 2012 survey results (*19*), but this paper incorporates comparable parameters from the 2008, 2014, and 2016 surveys, as well as selected information from the 2013 comprehensive survey.

The following summarizes some of the key findings of the event-specific surveys for 2008 to 2016 and the 2013 survey that covered all previous participants.

Overall Success and Helpfulness

One of the core questions in the follow-up surveys initiated after the 2010 event related to the perceived overall success and helpfulness, as based on a five-step Likert scale. Figure 4 shows that the events in 2010 to 2016 were rated highly for overall success and helpfulness. This result is a primary reason the overall structure of REES has remained fairly stable. The figure also shows that participants expressed a high level of interest in obtaining grants for the development of educational materials in the field. As presented in the 2013 paper (*19*), some REES follow-up surveys included ratings on the transferability of the educational modules. Although there has been greater variation between the individual module ratings than the overall success and helpfulness scores, most modules have been rated as highly transferable.

2014 REES 1	2014 REES 2	2014 REES 3	2016 TRAC/REES[a]	
	Johnson County Community College		University of Illinois at Urbana–Champaign	
Introduction Railroad Engineering	Dynamic Models of Railway Systems	Railway Course/Program Development and Coordination	Track Structure Design Tutorial[b]	Introduction to Motive Power[b]
Introduction Railroad Infrastructure	Train Performance	Raising Student Interest and Recruiting through Student Chapters	Track Geometry Tutorial[b]	Train Performance Simulation and Vehicle Dynamics Tutorial[b]
Train Energy, Power, and Traffic Control	Introduction to Railroad Capacity	Railroad Engineering Design Case Studies	Interactive Classroom Activities	Signal and Communication Tutorial[b]
Railroad Intermodal Transportation	Advanced Train Operations	Introduction to Rail Software 1	Rail Bridge Design	Railway Electrical and Mechanical Engineering Course Content Development
Railroad Alignment Design and Geometry	High-Speed Rail Design	Introduction to Rail Software 2	Railway Curriculum and Program Development Discussion	
Transit Commuter Intercity Rail Transportation	Shared Corridor Challenges	Current Research Programs and Needs		
	James Carter, Norfolk Southern		Cuck Gullakson, CSX	
	BNSF J. L. Patterson Associates Hanson Professional Services		Brian Lindamood, Alaska Railroad, AREMA President Canadian National Railway Union Pacific Railroad CH2M Hanson Professional Services	
	BNSF Argentine Yard, Kansas City Intermodal Facility, Edgerton, Kans.		Norfolk Southern Decatur Yard, University of Illinois at Urbana–Champaign RailTEC RAIL Lab	

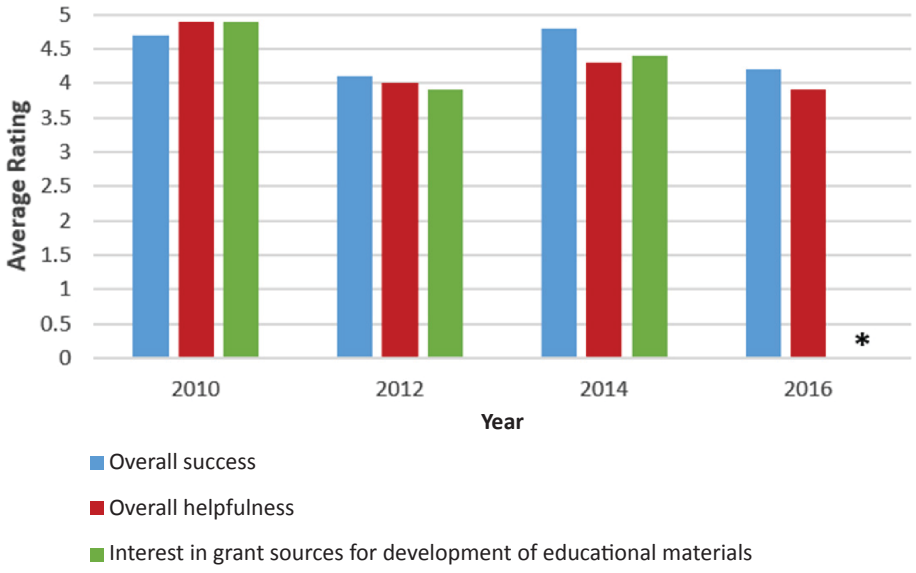

FIGURE 4 Overall participant ratings of 2010–2016 REES events and interest in grants to develop educational materials (1 = not successful/helpful/interested; 5 = extremely successful/helpful/interested; * = question not included in survey).

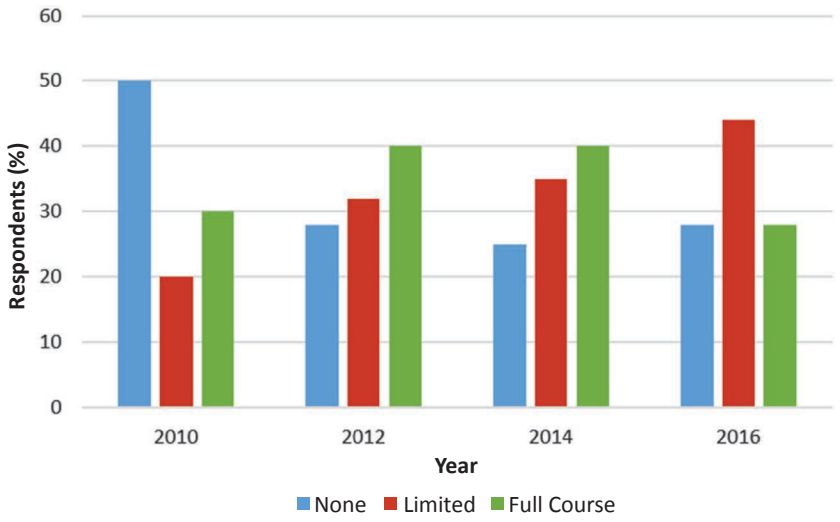

FIGURE 5 Railroad content included before REES event, 2010–2016.

Curriculum Development

The second key category covered in the surveys was inquiries on the railway content included in the curriculum of participating universities before the event and their plans for future incorporation of materials obtained through REES. At more recent REES events, less than one-third of the universities had no railroad content before the event, dropping from half the participants earlier (Figure 5). For 2012 on, this drop is partially explained by the inclusion of specific modules for returning professors in the event program (Table 1).

Most participants plan to use the materials either as modules within existing courses or as part of new undergraduate courses in railways or transportation (Figure 6). This is a reasonable use because of the extent and type of modules included in REES. Even with the addition of REES 2 and 3, the modules by themselves are insufficient to develop a full semester-long course. In addition, most topics are introductory and so are more applicable to existing or undergraduate courses.

The 2013 comprehensive survey provided information on implementation of courses by participating universities. Although the respondent group is smaller, Figure 7 shows the actual increase in inclusion of provided rail content within courses, demonstrating the effects of REES. Asked about the main reason for not including REES materials in their curriculums, respondents most commonly cited the lack of complementary materials to support the REES modules, such as class examples, lecture notes, and homework assignments. This finding was the primary motivation for expanding the 2016 REES program to include tutorial sessions demonstrating in-class examples and homework problems that build on previous REES modules.

Other REES Outcomes

In addition to direct outcomes measured in the surveys, REES has led to tangible results that have affected the development of railway engineering education and academic participation in the field.

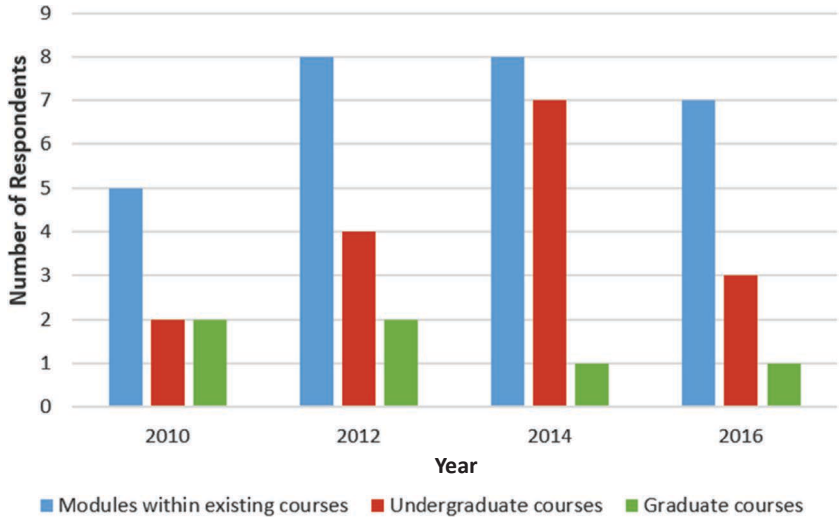

FIGURE 6 University plans for REES lecture materials following event, 2010–2016.

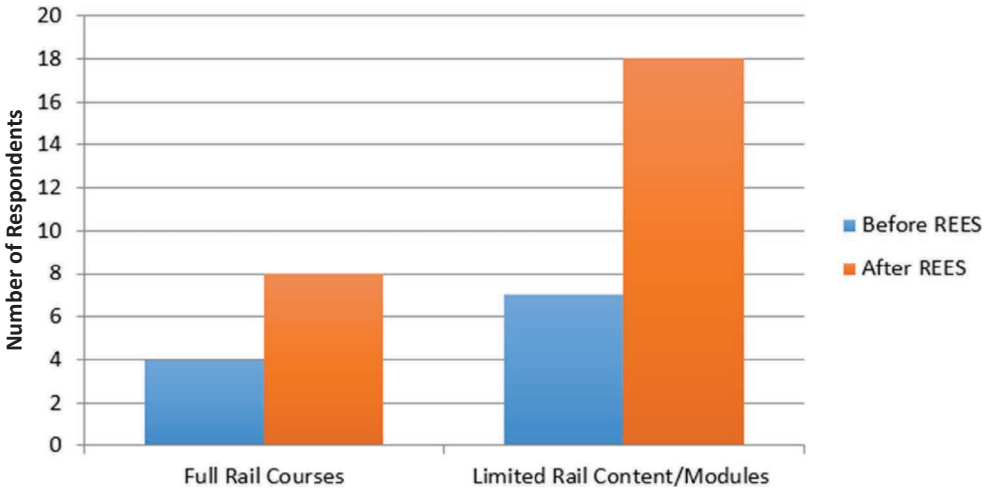

FIGURE 7 Respondents reporting incorporation of 2008–2012 REES materials in university curriculum, according to 2013 comprehensive survey of previous REES attendees.

One of the indirect impacts of REES is that more universities are participating in AREMA. According to a scan of AREMA records, 25 REES participants from the events of 2008 to 2014 (22%) are now AREMA members, a significant increase in the overall number of academic AREMA members. In addition, in 2008 there were only two AREMA student chapters. That number has increased to 20 official student chapters, and 16 of those (80%) are at universities that have participated in at least one REES event (*20*). The 2014 REES event included a session on the benefits of AREMA student chapters for rail industry recruitment. Through meetings with invited rail industry speakers, field trips, and other outreach and social activities, these AREMA student chapters play an important role in increasing awareness of career opportunities in railway engineering among all students on campus. Joint activities between student chapters and the annual quiz bowl competition at the AREMA annual meeting further strengthen bonds within the growing railway academic community.

REES has encouraged organizations in addition to AREMA to become involved in similar activities to facilitate academic participation in other aspects of railway engineering. In 2015, APTA collaborated with AREMA and NURail to conduct the first Passenger Railway Engineering Education Symposium (p-REES) that attracted 33 professors from the United States and Canada (*21*). The p-REES modules included a mix of original content specific to transit, commuter, and intercity passenger rail and existing REES modules modified to highlight learning points relevant to students interested in passenger rail planning, design, and operations. APTA plans to continue p-REES biannually during the off-years of the REES event.

Finally, because of REES, more universities are expanding their rail-related activities beyond incorporating educational materials into their transportation engineering curricula. The development of railway educational and research activities at four of these universities, Rose-Hulman Institute of Technology, University of Nevada Las Vegas, University of South Carolina, and Villanova University, were highlighted in a 2013 paper by Lautala et al. (*19*). Since that time, these universities have continued their expansion in the field, and the list of such universities has grown. This long-term result suggests that REES is succeeding in rebuilding the railway academic community and the relationship with the rail industry that was nearly lost.

REES and Industry Employment

From an industry perspective, one of the core metrics for measuring the success of REES is placement of students in permanent positions and internships within the rail industry. In addition to direct employment with railroads, students secure employment with rail-focused consultants, manufacturers, and government agencies. Students in courses prompted by REES have gone on to careers in academia with a focus on rail.

However, employment numbers should not be the sole measure of success. Because of the wide array of potential employers and number of institutions involved, it can be difficult to track the eventual job placement of all students enrolled in courses that were created or modified as a result of REES. Not all students report job placements to teaching faculty, and some may enter the rail industry after exploring other opportunities. The success of student placement from schools participating in REES is affected by the campuses selected for railroad recruitment and the availability of positions in the industry in a particular year.

The available data show that students participating in rail courses at the seven NURail partner campuses go on to fill an average of 25 full-time and 35 intern positions in the rail industry each year. In addition, some of the REES universities that later became NURail affiliate universities have reported placements ranging from single digits to more than 10 (*1*). Anecdotally, reports from REES attendees such as Rose-Hulman Institute of Technology suggest that after starting a rail course, two or three students per year will find employment with the rail industry though there was no previous interest.

CONCLUSIONS

REES has been a short-term success in increasing awareness of the railway engineering field among civil engineering faculty and increasing the amount and quality of railway engineering content in engineering programs at many institutions. Evolving from a program

focusing on professors with no rail exposure to a user conference for those engaged in railway education, REES has taken the first steps toward the long-term objectives of rebuilding the railway academic community. REES has resulted in unanticipated benefits such as the rapid expansion of the AREMA student chapter program, which will benefit the railway industry for years to come.

Despite its successes, REES is not without limitations and challenges. Funding and faculty commitments limit REES to an event held every other summer. Even with travel stipends sponsored by the rail industry, the biannual frequency of the event and the specific timing during the summer when there are few competing events targeted to faculty greatly limit participation by interested faculty. Online, on-demand availability of recorded REES modules and REES material is part of the solution, but a simple download does not provide professors with the full benefits of REES attendance, such as networking and detailed individual discussions of potential railway engineering research topics.

The 2-year interval between events also limits the ability of professors to interact and share their REES materials experiences after each academic year. Additional REES webinars or other methods of online communication could help refine railway course lecture material, class examples, and assignments and facilitate their expansion to disciplines beyond civil engineering.

Finally, as the railway academic community grows and matures, REES must evolve to strike the proper balance between content designed to fulfill the original objective of exposing new professors to the railway field and content covering advanced topics for professors already engaged in railway education activities or for those who are highly specialized in only a particular aspect of railway engineering. Keeping the full spectrum of attendees interested and engaged while maintaining a critical mass of professors in each session is a challenge for REES 2018 and beyond. Many within the rail industry, looking back at the state of railway engineering education as little as 10 to 15 years ago, would conclude that this challenge is a sign of a successful REES program and is a good problem to have.

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